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GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1979 REVISION)

By D. L. Johnson and S. C. Brown
Space Sciences Laboratory

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*George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama*

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16. ABSTRACT This report presents revised ground-level runway wind statistics for the Kennedy Space Center, Florida area. Crosswind, headwind, tailwind, and headwind reversal percentage frequencies are given with respect to month and hour for the Kennedy Space Center Space Shuttle runway. This document supersedes NASA TM-78181 and should be used in place of it.			
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FOREWORD

This revised document was required because of input data format problems which led to errors in the ground wind tables of NASA Technical Memorandum 78181, July 1978. This document corrects and supersedes NASA TM-78181 and should be used in place of it.

TECHNICAL MEMORANDUM 78229

GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA
(1979 REVISION)

I. INTRODUCTION

This report deals with surface-level wind conditions for NASA's Kennedy Space Center (KSC), Florida, including the Cape Canaveral, Florida, area. Since KSC will be the primary landing site after the first four Orbital Flight Tests of the Space Shuttle, these statistics may prove useful in mission planning activities. This report presents low-level crosswind, headwind, tailwind, and headwind reversal statistics by hour and month for use with the main KSC Shuttle runway orientation.

The winds were recorded at the Cape Canaveral Air Force Station (CCAFS). In March 1978 the wind observation site was moved to the Shuttle runway. Even though the Shuttle runway (approximately 11.5 miles northwest of the CCAFS wind observation site) may exhibit some differences in the wind regime — perhaps more thunderstorms or different sea-breeze effects — the wind statistics presented provide the best available mission planning information to date. This document supersedes NASA TM-78181 and should be used in place of it.

II. ARRANGEMENT OF TABLES

Tables are numbered and arranged by monthly reference period, with subnumbers used to identify the crosswind, tailwind, headwind, or reversal statistics within each month as follows:

Section III

Crosswind: Tables 1.1 through 13.1

Tailwind: Tables 1.2 through 13.2

Crosswind versus Tailwind: Tables 1.3 through 13.3

Headwind Reversals: Tables 1.4 through 13.4

Headwind: Tables 1.5 through 13.5.

III. RUNWAY CROSSWINDS, TAILWINDS, AND HEADWIND REVERSALS

A. Background

A study similar to the one presented here was previously done for the NASA/KSC, Florida area in October 1972 [1]. That study used hourly peak ground wind data to determine optimum runway orientation by minimizing critical high crosswind component frequencies. The proposed runway orientation was then used in conjunction with the hourly peak wind data to determine frequencies of headwind-to-tailwind reversals that resulted in specified tailwind speeds. The present KSC wind study expands on the two types of information determined previously for KSC and adds a section on tailwinds and headwinds alone. This type of runway wind study was also completed for the Edwards AFB area [2].

B. Runway Orientation

The runway of interest for NASA Shuttle Orbiter landings at KSC is Space Shuttle runway 15-33 (150-330 degrees). Figure 1 is an artist's conception of the Space Shuttle Orbiter making its final approach (toward the north) onto the KSC runway end 33 after completing a space mission. Figure 2 indicates the general layout of the Shuttle runway. The runway is designated 15-33 because of its angle of separation in degrees clockwise from magnetic north and indicates a pilots approach toward that direction. That is, a pilot desiring to land toward the south on 15-33 would enter from the north end (15), thereby allowing him to land toward 150 degrees. The runway orientation with respect to true north is within 0.5 degree of magnetic north. All magnetic runway wind statistics given in this report were computed with respect to true north.

The Shuttle runway is oriented so that a vehicle landing from the northwest toward the southeast will probably be landing into a headwind during the summer months. Figure 3 [3] gives the prevailing surface wind direction versus hour and month. The respective percentages of the prevailing direction are given within each box. These prevailing KSC wind directions were developed by using

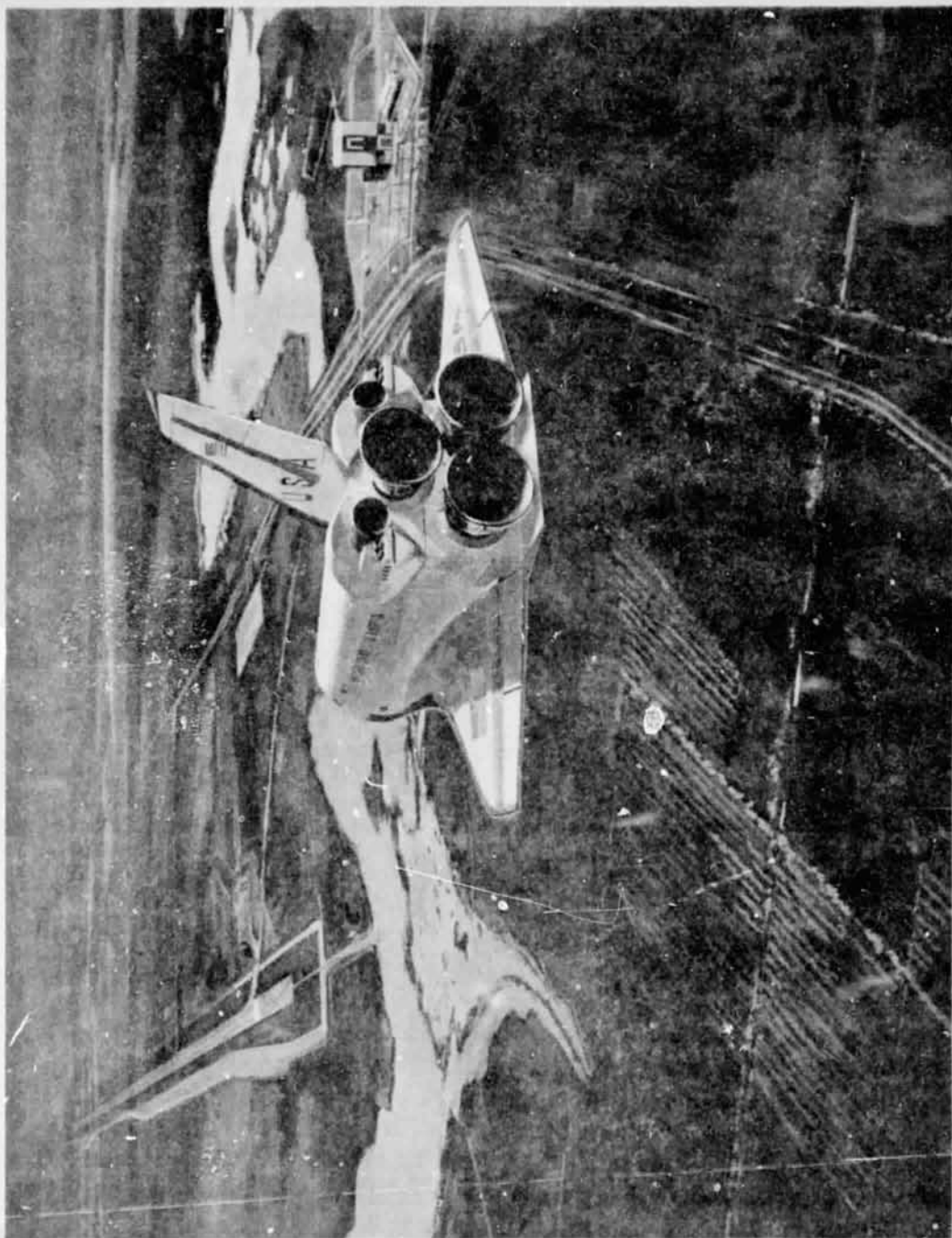


Figure 1. Space Shuttle Orbiter landing on runway 33 at KSC, Florida.

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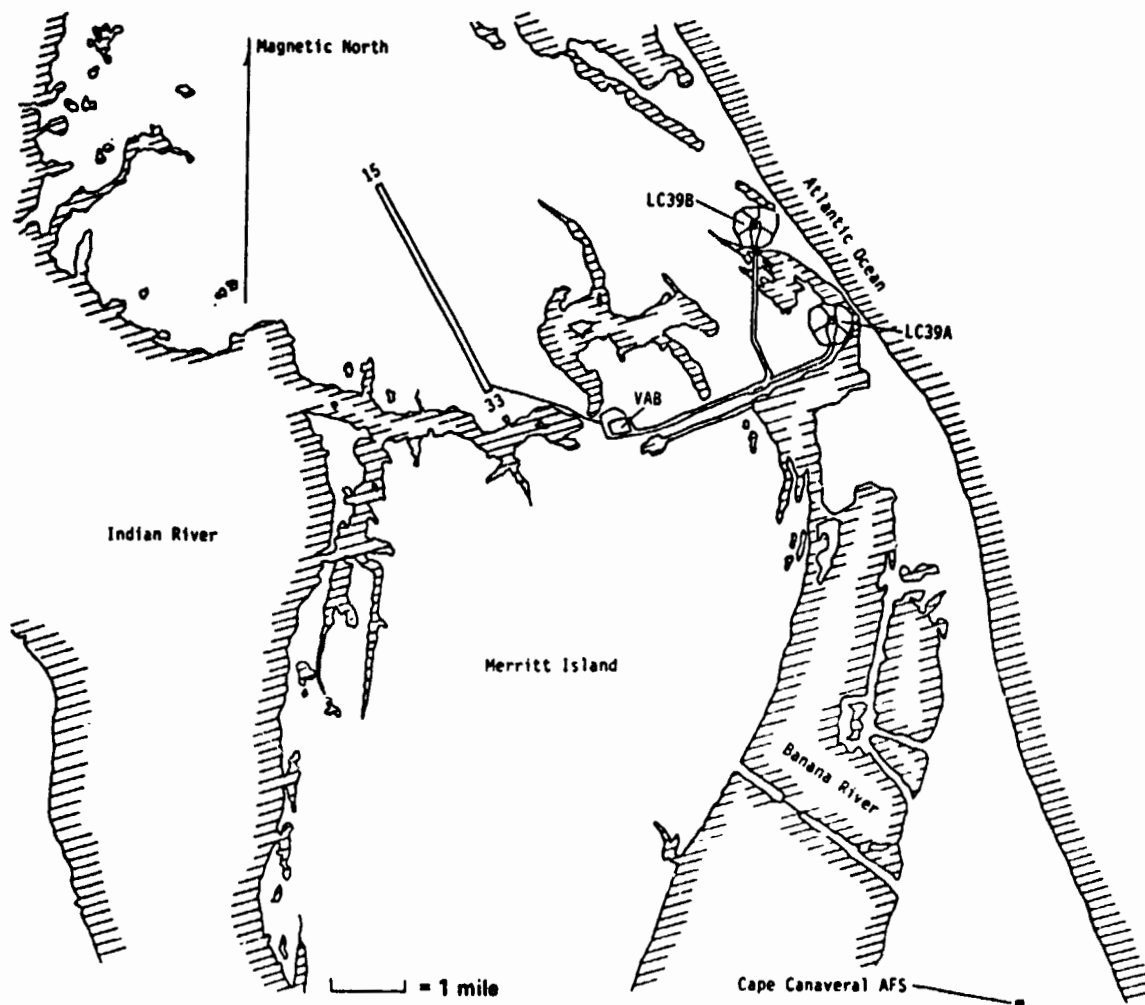


Figure 2. KSC Space Shuttle runway 15-33.

hourly mean values. Generally, a 1-minute average is taken about each hour, on the hour, to obtain a mean hourly wind. From Figure 3 one can see that runway 15 headwinds (winds from east through south) prevail from April through September for most all hours of the day. Headwinds for runway 33 (winds from the northwest and north) prevail in the winter for most all hours from November through February, with March and October classified as transition months. Mean hourly surface wind speeds (in knots) versus hour and month are given in Figure 4 [3]. It can be seen that wind magnitudes generally pick up during the afternoon hours [1200-1700 local standard time (LST)], with larger magnitudes generally observed during the fall, winter, and spring months. The KSC mean wind information, as presented in Figures 3 and 4, is not to be confused with the peak wind statistical tables presented in the remainder of this report.

KSC AUG 50 – DEC 70 P.O.R.

3 hour INTERVALS (LST)

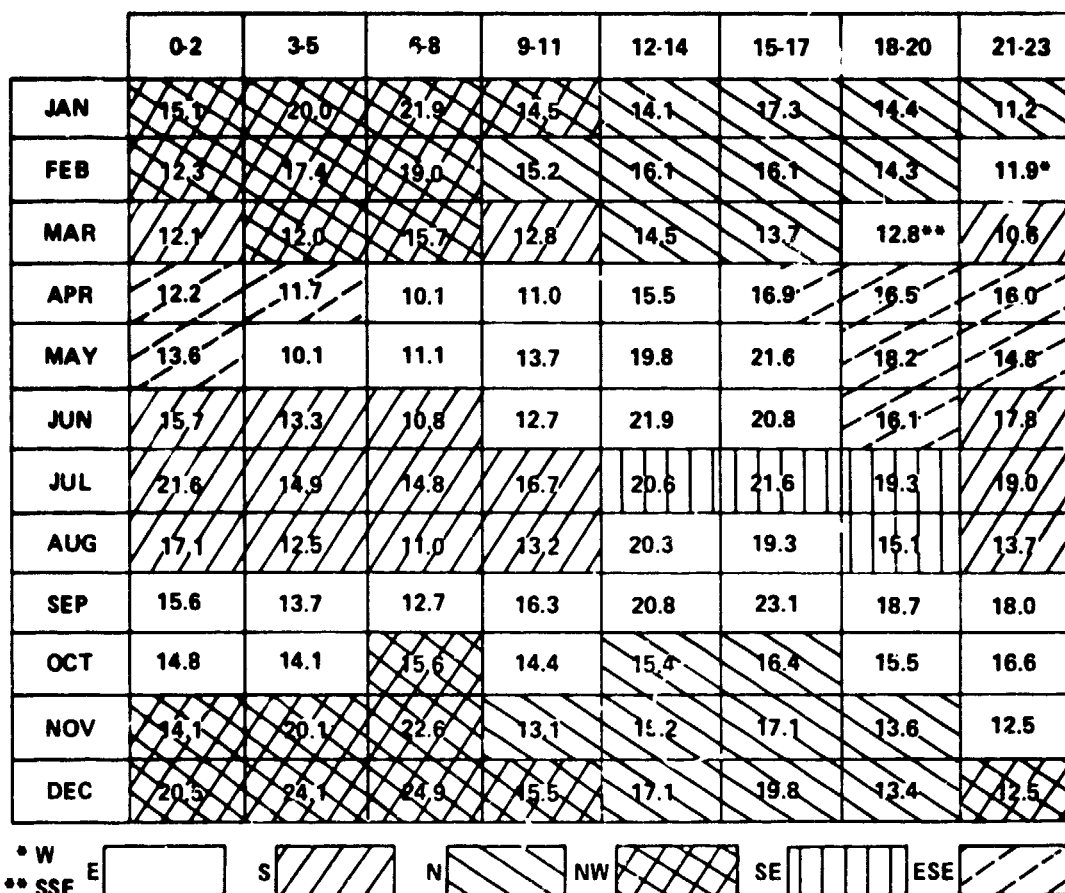


Figure 3. KSC percentage of prevailing wind direction.

C. Data Used

The ground wind speed and direction data used in this study were taken from a magnetic tape containing the CCAFS hourly surface peak wind observations (similar to Reference 4). The period of record extended from September 1958 through December 1977. The tape gave a total of 159,938 hourly peak wind observations for KSC, Florida. All calms were included in the data sample. The hourly peak wind sample used here is the peak wind speed (and associated direction) observed between 30 minutes prior to and 30 minutes after the hour. Speeds were read to the nearest whole knot, directions to the nearest degree. During the period of record the anemometer location was changed several times. However, most of the observations were made approximately 10 meters (33 feet)

KSC P.O.R. AUG 50 - DEC 70

3 hour INTERVALS (LST)

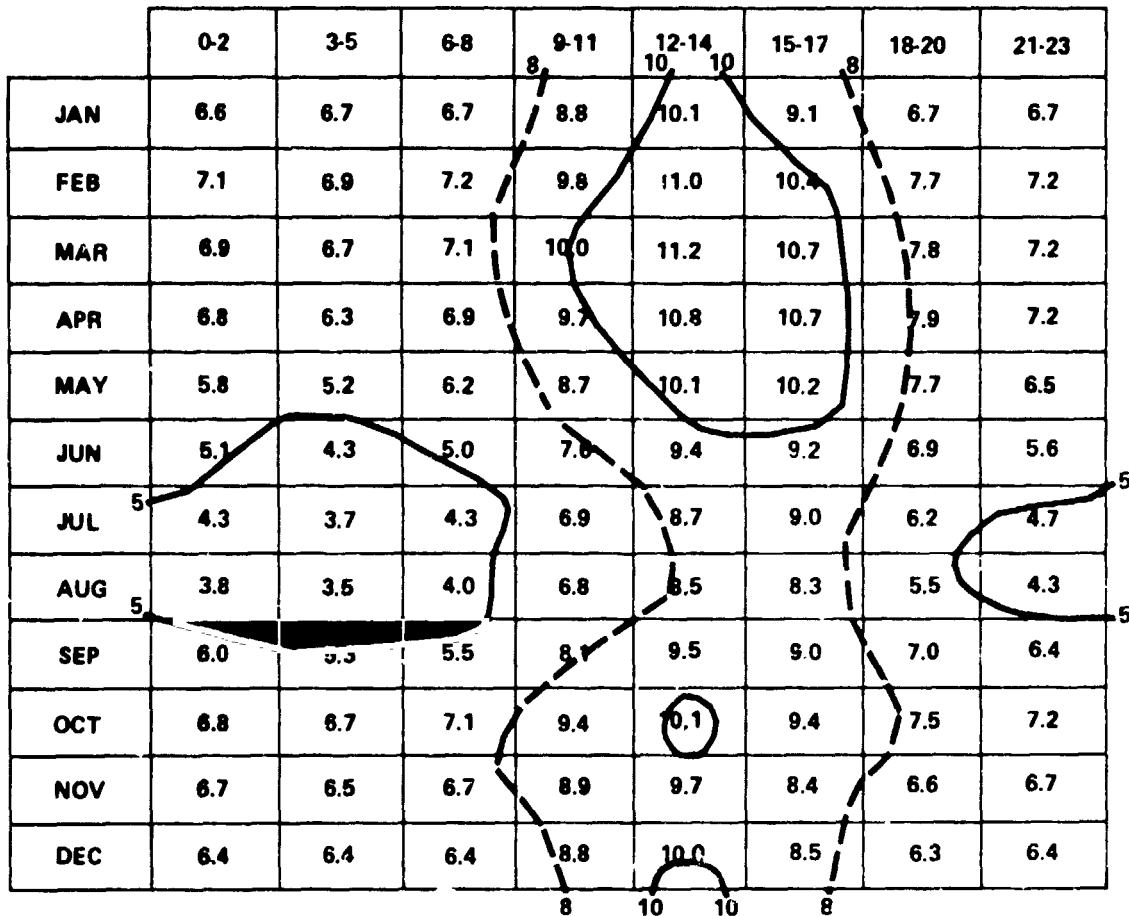


Figure 4. KSC mean surface wind speed (knots).

above natural grade. In Space Shuttle vehicle ground wind related analyses, peak wind speeds (or gusts) are generally more useful in design, mission planning and operational activities.

D. Computational Methods/Equations

1. Crosswind Procedure. This section includes a discussion of the computational methods used in obtaining the percentage frequency of occurrence within critical crosswind intervals, i.e., 1 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, and 25 and up knots. The crosswind equation used for the runway is:

$$\text{Crosswind} = (\sin | \text{WD} - \text{RA} | \times \text{WS}) \quad (1)$$

where

RA = runway angle measured from true north

WD = wind direction in degrees clockwise from true north

WS = wind speed in knots.

The runway crosswind component for each observation was computed and then checked against the several critical crosswind intervals, and a tally was entered into the appropriate matrix position. Every wind observation (159,938 total observations) was handled in this manner.

The percentage frequency of occurrence of crosswind components within these critical intervals was next calculated for each matrix position by dividing the total number in that position by the total number of observations and multiplying by 100; i.e.,

$$\text{Percent frequency} = (S/T) \times 100 \quad (2)$$

where S is the number of cases within the critical crosswind interval and T is the total number of wind observations for that time interval. These runway crosswind percentage frequencies are given by month in Tables 1.1 through 13.1 for each 3 hour period of the day.

2. Tailwind Procedure. In addition to critical crosswinds adversely affecting the landing of space vehicles and aircraft, headwind reversals (i.e., a headwind changing to a tailwind) also can present problems. Given in this section are percent frequency of occurrence tables that pertain to critical tailwind and tailwind/crosswind speeds. The crosswind computations discussed in the last section of this report do not require a specification of the landing direction since a wind component is calculated normal to the runway. This means that a critical crosswind that affects the vehicle from either the left or right side is tallied. However, in analyzing headwinds and tailwinds, the direction of the component parallel to the runway is important. If, for example, it were necessary to land on runway 15 (from northwest), a wind component from the northwest (a tailwind) would be unfavorable. In the computations performed here, parallel runway winds were computed using the following formula:

$$\text{Parallel wind} = \{ \cos | \text{WD-RA} | \times \text{WS} \} \quad (3)$$

where

RA = runway angle measured from true north

WD = wind direction in degrees clockwise from true north

WS = wind speed in knots.

When computing a parallel runway wind, sign is important. If equation (3) gives a positive velocity (+), it defines a tailwind. Conversely, a negative velocity (-) defines a headwind. Critical tailwind interval limits of 1 to 4, 5 to 9, and 10 and up knots were used by hour and month in computing the runway tailwind probabilities as given in Tables 1.2 through 13.2. Finally, crosswind-versus-tailwind percentages are given in Tables 1.3 through 13.3 by month and hour for each runway.

3. Headwind Reversal Procedure. In this analysis of runway headwind components an attempt has been made to answer some basic questions concerning 1-hour wind reversal frequencies. For example, (1) What is the probability that the wind component parallel to the runway will reverse direction? (2) Do reversals from northwest to southeast components occur as frequently as southeast to northwest changes? (3) Suppose the wind direction at some specified time is known; what then is the conditional probability of a reversal?

a. Frequency of Wind Reversals. To calculate this value it is only necessary to count those cases when the parallel wind component switches from one hour to the next; i.e., if the component goes from (+) to (-) or from (-) to (+), this indicates a switch and is tallied. Dividing this tally by the entire hourly data sample gives a percent frequency (occurrence rate) of the wind reversing on the runway over that time interval. This procedure is expressed in equation (4) as follows:

$$X(I,J) = \frac{100 Y(I,J)}{Z(I,J)} \quad (4)$$

where

X(I,J) = percent frequency of parallel component wind reversal for month I and time period J

$Y(I, J)$ = number of occurrences of parallel wind reversals during month I and time period J

$Z(I, J)$ = total observations during month I and time period J.

The reversal tallies were entered on the resulting hour; i.e., a reversal wind between 0700 and 0800 LST is entered at 0800 LST (the resulting time). However, since hours are combined into time intervals, this was entered as a tally within the 06-08 3-hour time interval. These values are listed in column 1 (TOTAL) of Tables 1.4 through 13.4A.

b. Southeast to Northwest and Northwest to Southeast Reversals.

How often does a southeast wind component reverse to a northwest wind component from one hour to the next? To compute these reversals, the number of southeast to northwest component changes are tallied and then divided by the total number of observations for that time period. These values appear in column 2 (HEAD-TAIL) of Tables 1.4 through 13.4A for runway 15 but in column 3 (TAIL-HEAD) for runway 33. Wind component changes from northwest to southeast are calculated in the same way.

c. Conditional Wind Reversals. Given a southeast parallel component wind initially, how often does this southeast wind change into a northwest wind component by the next hour? This third question deals with the conditional statement that given a southeast wind, what is the probability of its changing into a northwest wind; i.e., $P(NW|SE)$. In this third question we must look at only the hourly southeast components in the data sample and then tally the southeast to northwest wind changes over an hour. This tally must be divided by the number of southeast wind components in the sample, not by the total data sample, because prior knowledge of the wind direction is assumed (i.e., southeast winds are set as given initially). See columns 4 and 5 of Tables 1.4 through 13.4A. Likewise, column 5 presents the conditional percentage frequency of a northwest to southeast reversal by using the same method.

In this section the following conditional probability equation was used:¹

$$P(X|Z)_{ij} = \frac{100 Y(I, J)}{Z(I, J)} \quad (5)$$

1. The terminology given here is reversed when considering the probability of a headwind given a tailwind.

where

$P(X|Z)_{ij}$ = conditional probability of the occurrence of a tailwind (X)
given a headwind (Z) initially during month I and time J

$Y(I, J)$ = the number of headwind-to-tailwind changes during month I
and time period J

$Z(I, J)$ = the total number of headwinds in the month I/time J data
sample.

Tables 1.4B through 13.4B also give headwind reversal statistics, but here the statistics are broken out into specified resultant tailwind magnitude categories (i.e., resultant tailwinds of >0-3, 4, 8, >8 knots).

Throughout this headwind reversal section both calm conditions and direct crosswinds were considered as favorable landing conditions.

4. Headwind Component Procedure. Headwind component statistics parallel to the runway are often requested. Computed in Tables 1.5 through 13.5 are cumulative percentage frequencies of headwind components calculated along the runway during daytime hours (06-17 hours). These tables were computed by equation (3), using only those wind observations that displayed a headwind component along the specified runway. This means that for the runway 15 computations, for example, all observations of wind directions from approximately west through north to east (tailwind components) were eliminated. This accounts for the lower number of total observations given in the tables. The component speed column should be interpreted as follows: 0-1 includes speeds from 0 to 0.9 knot; 1-2 contains values from 1.0 to 1.9 knots, etc. Calms are included in the zero category.

E. Explanation of Tables

Tables 1.1 through 13.1, 1.2 through 13.2, and 1.3 through 13.3 of this report are presented as percentages of crosswinds or tailwinds within selected wind speed intervals only. Since probability questions of the type "greater than or equal to a certain value" are usually asked (indicating an accumulated effect), one must add together rows of percentages and, at times, columns as well. Tables 1.4A through 13.4A give the percent of wind reversals for "all" resultant tailwind (or headwind) magnitudes, whereas Tables 1.4B through 13.4B break out the reversal statistics into specified tailwind categories.

The critical crosswind or tailwind speed interval headings, 1 to 4, 5 to 9, etc., are to be interpreted as 1 through 4 knots, 5 through 9 knots, etc. Also, zero crosswinds are classified as all winds that are (1) calm, (2) < 1 knot, and (3) parallel to the runway. Zero tailwinds have not been tabulated, but all tailwinds > 0 knots and < 1 knot were placed within the 1 to 4 knot classification interval during data analysis. The time intervals given (i.e., 00-02, etc.) indicate eight 3 hour intervals, and they are expressed in LST.

1. Crosswind Example. Tables 1.1 through 13.1 give percentages of critical crosswind occurrences within critical crosswind speed intervals versus hour of day for the runway and month. Since runway end number does not matter when computing crosswinds, the runway is listed as 15-33 on these tables. Examples follow concerning the use of Tables 1.1 through 13.1 in which crosswind occurrence percentages can be easily calculated by summing up percentages in the appropriate row. For runway 15-33 between hours 00-02 for the April reference period, Table 4.1 gives a 56.53 percent chance of encountering a crosswind ≥ 5 knots. One must add $34.14 + 14.53 + 6.43 + 1.24 + 0.19 = 56.53$. This also means that 43.48 percent (i.e., $35.56 + 7.92 = 43.48$) of the crosswinds are < 5 knots. Similarly, crosswind percentages ≥ 20 knots can be computed for all hours on runway 15-33 by adding, on the 00-23 line (under HRS), $0.36 + 0.20$ to arrive at a percentage of 0.56. In this same category, zero crosswinds (calm conditions, crosswinds < 1 knot, or winds parallel to the runway) occur 2.19 percent of the time.

2. Tailwind Example. Tables 1.2 through 13.2 give percentage frequencies of tailwind components within critical tailwind speed intervals versus hour of day for the runway heading and month. Since landing direction does play a part in the computation of tailwinds (or headwinds), the runway is listed as 15 and 33, indicating the approach direction (i.e., 15 is landing into 150 degrees from the northwest end of the runway). Some examples follow that indicate the use of Tables 1.2 through 13.2. Again, the format of the tables is similar to that of Tables 1.1 through 13.1, and the tailwind statistics presented are not accumulated. The April tailwind percentage ≥ 5 knots between 00-02 hours LST for runway 15 as presented on the left side of Table 4.2 is 18.31 ($11.07 + 7.24 = 18.31$). The companion table of 4.2 indicates a tailwind percentage of 42.74 for runway 33 for the same specified conditions. The 42.74 percent on runway 33 can also be interpreted as the percentage of headwinds on runway 15. A tailwind on one runway heading (33) is a headwind on the other end of the runway (15). Combined percentiles for all hours can be obtained from the 00-23 row.

Tables 1.3 through 13.3 give percentages for the joint occurrence of winds within selected crosswind versus tailwind speed intervals. These monthly tables are presented for each end of the runway and are displayed by hour of day (LST). Tables 1.3 through 13.3 offer the advantage of obtaining percentages by choosing the critical crosswind and tailwind limits concurrently, not separately. That is, suppose both crosswinds and tailwinds ≥ 5 knots are critical to a landing operation for 00 hours during April on runway 15, one would find the intersection number that pertains to the intervals of crosswind 5 to 9 and tailwind 5 to 9. In this case, the number in Table 4.3 is 3.90 percent. This is not the percentage number needed since these table percentages, again, are not accumulated. Therefore, one must sum all the tailwind rows ≥ 5 knots that encompass all crosswind values ≥ 5 knots. This will satisfy the required condition. Figure 5 illustrates the Table 4.3 example in more detail in that the percentage numbers to be added are enclosed by dashed lines. The total required sum of these ten numbers is 12.25, which is the required percentage.

RUNWAY 15, HOUR 0, KSC, FLORIDA, APRIL								
TAILWIND LIMITS	CROSSWIND LIMITS						ZERO CROSS	TOTAL ²
	1-4	5-9	10-14	15-19	20-24	25-UP		
1-4	5.57	5.38	2.60	0.93	0.00	0.19	1.11	* 15.77 *
5-9	1.67	3.90	3.15	0.37	0.19	0.00	1.30	* 10.58 *
10-UP	2.04	2.60	1.48	0.37	0.19	0.00	0.19	* 6.86 *
TOTAL ²	9.28	11.87	7.24	1.67	0.37	0.19	2.60	* 33.21 *

a. TOTAL PERCENTAGES WITHIN DASHED (---) AREA = 12.25 PERCENT.

Figure 5. KSC crosswind/tailwind speed interval percentages.

Since Tables 1.3 through 13.3 are the most involved of the tables presented thus far, a few notes of caution are issued that one should remember while using them. The total row and column offer a sum of all rows or columns, respectively. The total column (of Tables 1.3 through 13.3) has also added into it all the zero crosswind percentages. The percentage numbers enclosed by asterisks in Figure 5 show the percent frequency of tailwinds without regard to crosswind components. An example of using the total row follows. If one needs the percentage of all crosswinds ≥ 5 knots on runway 15 at 00 hours in April which encompasses all tailwind categories, he can sum the numbers 11.87, 7.24, 1.67, 0.37, and 0.19 to arrive at 21.34 percent. Why is this value so much less

- Figure 5 is taken from Table 4.3; because of computer round-off, the tabular numbers shown here may not total exactly.

than the 56.53 00-02 hour percentage of crosswinds ≥ 5 knots on runway 15-33 from Table 4.1? The answer is that the 21.34 percent corresponds to crosswinds ≥ 5 knots with regard to all tailwind categories. Tables 1.1 through 13.1 give crosswinds ≥ 5 knots with regard to all parallel winds (tail and head combined). To obtain comparable numbers, one must calculate from Table 4.3 the crosswind percentage ≥ 5 knots (33.22 percent) with regard to all tailwinds on runway heading 33 (a headwind on runway 15) and add the two percentages (21.34 + 33.22) to arrive at 54.56 percent, which corresponds closely to Table 4.1 values. The numbers will not be exact because Tables 1.1 through 13.1 and 1.2 through 13.2 give statistics in 3 hour groups, while Tables 1.3 through 13.3 are by each individual hour. Both tailwinds and headwinds from Tables 1.3 through 13.3 may have to be used depending upon the application.

3. Headwind Reversal Example. Tables 1.4A through 13.4A give the percentage of parallel runway wind reversals that answer the three questions posed earlier in this report concerning different runway wind reversal classifications. These tables present the probabilities for each runway end by month and 3 hour time period. Column 1 answers question 1 and gives the total reversals for all observations (within time and month category). Columns 2 and 3 answer question 2 by giving the percent frequency of headwind-to-tailwind and tailwind-to-headwind reversals, respectively, for all observations. Question 3 on conditional probability is answered in columns 4 and 5. It should be noted that the statistics presented in Tables 1.4A through 13.4A deal with the probability of reversals without regard to the resulting parallel-wind magnitude classification, as presented in Reference 1. This means, for example, that the columns regarding headwind-to-tailwind reversals (columns 2 and 4) were computed for all resultant tailwind components. On the "A" tables, all magnitudes of the resultant tailwinds were combined before the statistics were computed. However, Tables 1.4B through 13.4B present these same reversal statistics with respect to different categories of the resultant tailwind magnitudes.

These statistics should prove valuable to both the mission planner and the operational control authority because they are based upon a prior knowledge of the wind-type information that will be available during the mission. For example, consider a landing planned for 1000 LST in April on runway 15. Assume that the wind observed at 0900 LST is known to have a headwind component along that runway. Table 4.4A, column 4, indicates that 7.14 percent of those wind observations changed to such an extent that at the following hour (1000 LST) there was a tailwind component on runway 15. This percentage can also be obtained from the appropriate total column of Table 4.4B. Restated in terms of risk: with a known headwind component at 0900 LST, the risk of change to a tailwind component at 1000 LST is approximately 7 percent. Of course, this risk statement does not consider the forecast capability that would be utilized in the real-time operation.

If the investigator were interested in the percent of headwind reversals of all reversals which resulted in a tailwind of ≥ 4 knots, this can be obtained from Table 4.4B by adding 1.73 and 0.71 to arrive at 2.44 percent.

4. Headwind Component Example. Tables 1.5 through 13.5 give cumulative percentage frequencies of headwind components along the runway during the daytime hours. The use of the tables is illustrated by the following example: "What is the risk of a headwind component ≥ 20 knots on runway 15 at 12-14 hours in April?" Table 4.5 shows that 91.43 percent of the headwind observations were ≤ 19.9 knots. Conversely, there is a 8.57 percent risk of speeds ≥ 20 knots. "What is the 95 percentile headwind component speed from the same table?" Interpolation between 93.01 and 95.06 for 95 results in a speed of approximately 22 knots (in this case, closer to 23).

IV. CONCLUSION

In summary, this report provides different types of wind statistics applicable to the KSC, Florida area. Ground-level wind statistics are given computed with regard to the KSC Space Shuttle runway orientation. Crosswinds, tailwinds, headwinds, and headwind reversals are the different parameters computed by critical class intervals for hour, month, and runway. If cumulative percentage results are needed, one must follow the procedures given in this report and accumulate the appropriate percentages. The reader should consult Reference 1 for a further discussion concerning some small sources of error introduced by the use of peak wind data samples.

Further climatological and wind information involving the KSC area can be obtained from References 5 through 8.

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TABLE 1.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

JANUARY 15 - 33											
HRS	KSC PEAK WINDS MONTH OF JAN.						CROSSWINDS	ZERO CROSSWIND	TOTAL NUMBER OBS.		
	CROSSWIND										
	*****	CRITICAL LIMITS IN KNOTS *****	*****	*****	*****	*****					
	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE					
				PERCENTAGES							
00-02	44.32	25.93	8.16	2.81	.78	.12	17.98	1674			
03-05	45.56	24.91	7.89	2.99	.64	.24	17.56	1674			
06-08	44.44	25.51	7.89	3.23	.72	.36	18.16	1674			
09-11	33.59	30.41	14.46	6.63	1.55	.30	12.66	1674			
12-14	24.43	32.26	15.89	7.89	4.99	1.25	9.43	1674			
15-17	30.17	36.76	15.89	6.22	2.15	.66	10.46	1674			
18-20	40.95	20.27	7.65	4.48	.66	.12	19.77	1674			
21-23	42.10	22.56	6.72	4.30	.42	.12	21.86	1674			
00-23	37.66	27.34	10.53	4.82	1.26	.36	16.03	13391			

TABLE 1.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

HRS	KSC PEAK WINDS MONTH OF JAN.										TOTAL NUMREP OBS.		
	TAILWINDS												
	***** CRITICAL LIMITS IN KNOTS *****												
	***** PERCENTAGES *****												
	RUNWAY 15 TAILWIND					RUNWAY 33 TAILWIND							
	1	10	4	5	TO 9	10 ABOVE	1	10	4	5	TO 9	10 ABOVE	
00-02	17.60			18.56		17.20	16.10			11.43		8.36	
03-05	17.60			19.16		19.89	17.26			9.38		7.59	
06-08	17.44			20.79		20.55	16.31			8.48		7.29	
09-11	8.10			13.90		32.20	10.93			11.65		15.11	
12-14	8.36			12.96		31.54	7.89			10.99		20.37	
15-17	10.40			17.63		29.05	13.52			13.33		15.24	
18-20	18.88			15.11		18.76	16.43			13.80		8.66	
21-23	19.53			17.36		16.55	15.47			14.86		8.42	
00-23	14.76			16.39		23.22	14.11			11.74		11.39	

TABLE 1.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF JAN.										MONTH OF JAN.									
HOUR 0										HOUR 1									
NUMBER OBS. 558										NUMBER OBS. 558									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	13.22	4.12	1.43	.00	.00	1.97	17.74	8.60	5.20	1.08	.00	1.97	17.74	8.60	5.20	1.08	.00	.72	15.95
5 TO 9	8.42	3.76	1.79	.54	.36	3.76	18.84	5.02	3.76	1.43	.00	3.76	18.84	5.02	3.76	1.43	.00	2.33	13.44
10- UP	6.81	6.09	2.51	.72	.00	.00	16.49	4.48	3.23	.54	.00	.00	16.49	4.48	3.23	.54	.00	.18	8.96
TOTAL	25.45	13.98	5.73	1.25	.36	6.09	52.87	18.10	12.19	3.05	.00	6.09	52.87	18.10	12.19	3.05	.18	3.23	38.35
HOUR 2										HOUR 3									
NUMBER OBS. 558										NUMBER OBS. 558									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	13.42	4.06	.72	.18	.00	2.15	18.64	10.39	3.94	1.43	.00	2.15	18.64	10.39	3.94	1.43	.00	1.25	17.92
5 TO 9	8.24	4.30	.90	.36	.00	3.41	17.74	3.94	4.84	.90	.00	3.41	17.74	3.94	4.84	.90	.18	.00	2.87
10- UP	7.53	6.81	1.97	.72	.00	.36	17.18	3.41	2.51	.90	.00	.36	17.18	3.41	2.51	.90	.18	.36	7.35
TOTAL	25.99	15.77	3.58	1.97	.54	5.91	53.76	17.74	11.29	3.23	.00	5.91	53.76	17.74	11.29	3.23	1.25	4.48	38.17
HOUR 1										HOUR 2									
NUMBER OBS. 558										NUMBER OBS. 558									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	13.22	4.12	1.43	.00	.00	1.97	17.74	8.60	5.20	1.08	.00	1.97	17.74	8.60	5.20	1.08	.00	.72	15.95
5 TO 9	8.42	3.76	1.79	.54	.36	3.76	18.84	5.02	3.76	1.43	.00	3.76	18.84	5.02	3.76	1.43	.00	2.33	13.44
10- UP	6.81	6.09	2.51	.72	.00	.00	16.49	4.48	3.23	.54	.00	.00	16.49	4.48	3.23	.54	.00	.18	8.96
TOTAL	25.45	13.98	5.73	1.25	.36	6.09	52.87	18.10	12.19	3.05	.00	6.09	52.87	18.10	12.19	3.05	.18	3.23	38.35

TABLE 1.3. (Continued)

MSC PEAK WINDS													TAILWINDS VS CROSSWINDS												
MONTH OF JAN.													MONTH OF JAN.												
HOUR 3													HOUR 3												
NUMBER OBS. 558													NUMBER OBS. 558												
RUNWAY 15													RUNWAY 33												
*** CROSSWIND LIMITS ***													*** CROSSWIND LIMITS ***												
PERCENTAGES													PERCENTAGES												
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
1.00	4.12	1.25	.54	.18	.00	1.25	17.56	11.41	4.30	1.00	.18	.00	.00	.90	17.56	.00	.00	.00	.00	.00	.00	.90	17.56		
5 TO 9	4.12	.00	.18	.18	.00	4.12	18.64	4.30	3.94	.54	.54	.00	.00	.90	10.22	.00	.00	.00	.00	.00	.00	.90	10.22		
10- UP	5.74	5.27	3.05	.54	.36	.00	19.35	3.23	1.61	1.43	.36	.18	.18	.36	7.35	.18	.00	.00	.00	.00	.18	.36	7.35		
TOTAL	25.14	4.52	5.20	1.25	.72	.00	55.56	18.64	9.86	3.05	1.08	.18	.18	2.15	35.13	.18	.00	.00	.00	.00	.18	2.15	35.13		

MSC PEAK WINDS													TAILWINDS VS CROSSWINDS												
MONTH OF JAN.													MONTH OF JAN.												
HOUR 4													HOUR 4												
NUMBER OBS. 558													NUMBER OBS. 558												
RUNWAY 33													RUNWAY 33												
*** CROSSWIND LIMITS ***													*** CROSSWIND LIMITS ***												
PERCENTAGES													PERCENTAGES												
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
1.00	2.64	1.25	.74	.36	.16	2.51	17.53	10.39	5.02	1.43	.54	.00	.00	1.08	18.46	.00	.00	.00	.00	.00	.00	1.08	18.46		
5 TO 9	3.41	.54	.90	.00	.00	4.30	19.18	2.87	3.76	.54	.72	.00	.00	.72	8.63	.00	.00	.00	.00	.00	.00	.72	8.63		
10- UP	3.18	7.71	4.51	.72	.00	.36	20.67	2.87	2.33	1.61	.18	.36	.36	.18	7.53	.36	.00	.00	.00	.00	.36	.18	7.53		
TOTAL	25.44	13.60	4.30	2.33	.36	.16	56.27	16.13	11.11	3.58	1.43	.36	.36	1.97	34.59	.36	.00	.00	.00	.00	.36	1.97	34.59		

MSC PEAK WINDS													TAILWINDS VS CROSSWINDS												
MONTH OF JAN.													MONTH OF JAN.												
HOUR 5													HOUR 5												
NUMBER OBS. 558													NUMBER OBS. 558												
RUNWAY 15													RUNWAY 33												
*** CROSSWIND LIMITS ***													*** CROSSWIND LIMITS ***												
PERCENTAGES													PERCENTAGES												
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
1.00	4.12	.00	.72	.00	.18	4.51	18.46	9.32	3.23	1.43	.54	.00	.00	1.25	15.77	.00	.00	.00	.00	.00	.00	1.25	15.77		
5 TO 9	11.65	2.87	1.43	.18	.16	3.23	19.71	3.23	3.94	.72	.18	.00	.00	1.25	9.32	.00	.00	.00	.00	.00	.00	1.25	9.32		
10- UP	9.14	8.06	1.97	.16	.72	.18	20.25	2.33	3.23	1.08	1.08	.00	.00	.18	7.89	.00	.00	.00	.00	.00	.00	.18	7.89		
TOTAL	30.62	15.05	4.30	1.08	.90	.36	58.42	14.87	10.39	3.23	1.79	.00	.00	2.69	32.97	.00	.00	.00	.00	.00	.00	2.69	32.97		

TABLE 1.3. (Continued)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF JAN.										MONTH OF JAN.									
HOUR 6										HOUR 6									
NUMBER OBS. 554										NUMBER OBS. 554									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	10.22	3.94	1.08	.90	.19	.00	2.69	19.00	9.32	3.05	1.79	.18	.00	.00	1.25	15.59			
5 TO 9	12.01	2.9	.72	.54	.18	.00	3.58	19.71	4.12	3.05	.90	.54	.00	.00	.54	9.14			
10- UP	8.24	8.24	2.51	.13	.18	.00	.54	19.89	2.33	3.23	1.43	.18	.18	.00	.00	7.35			
TOTAL	30.47	14.87	4.30	1.61	.54	.00	6.81	58.60	15.77	9.32	4.12	.90	.18	.00	1.79	32.08			
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF JAN.										MONTH OF JAN.									
HOUR 7										HOUR 7									
NUMBER OBS. 558										NUMBER OBS. 558									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	11.47	3.76	.72	.72	.50	.18	1.61	18.46	6.42	5.20	1.25	.54	.18	.00	.90	16.49			
5 TO 9	10.75	3.41	.70	.72	.18	.00	4.66	20.61	2.15	3.58	1.43	.00	.18	.00	.54	7.69			
10- UP	9.86	5.73	2.69	.72	.50	.00	1.43	20.43	2.69	2.69	1.04	.54	.00	.00	.00	6.99			
TOTAL	32.08	12.90	4.30	2.15	.18	.18	7.71	59.50	13.26	11.47	3.76	1.08	.36	.00	1.43	31.36			
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF JAN.										MONTH OF JAN.									
HOUR 8										HOUR 8									
NUMBER OBS. 558										NUMBER OBS. 558									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	8.24	2.47	1.08	.54	.36	.00	1.79	14.87	7.69	5.56	1.08	.00	.00	.00	1.25	16.85			
5 TO 9	11.47	3.94	.72	.90	.36	.00	4.66	22.04	1.79	4.30	1.43	.00	.00	.00	.90	8.82			
10- UP	10.08	8.24	1.79	.72	.18	.00	.36	21.33	2.33	3.05	1.04	.72	.00	.00	.36	7.53			
TOTAL	29.75	15.05	3.58	2.15	.90	.00	6.61	58.24	12.01	12.90	3.58	1.79	.00	.00	2.51	32.80			

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TABLE 1.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF JAN.		NUMBER OBS. 558		RUNWAY 15		RUNWAY 33		TOTAL		ZERO CROSS		25- UP		25- UP		TOTAL	
LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	1 TO 4	5 TO 9
1 TO 4	1.76	2.33	1.61	.72	.00	.00	.00	1.61	10.04	4.30	4.66	1.97	1.08	.36	.18	.18	.18	.18	.18	.18	.18
5 TO 9	7.71	3.44	1.43	.54	.00	.00	.00	4.12	17.74	2.47	3.23	2.09	1.08	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	13.00	11.93	1.97	.90	.36	.00	.00	.72	28.67	3.94	3.94	2.87	.90	.18	.00	.00	.00	.00	.00	.00	.00
TOTAL	25.27	17.20	5.02	2.15	.36	.00	.00	6.45	56.45	11.11	11.83	7.53	3.05	.54	.18	.18	.18	.18	.18	.18	.18
KSC PEAK WINDS																					
LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	1 TO 4	5 TO 9
1 TO 4	1.79	2.87	1.45	.72	.18	.00	.00	6.99	1.25	3.76	3.05	2.33	.54	.00	.18	.18	.18	.18	.18	.18	.18
5 TO 9	5.22	4.48	1.08	.54	.00	.00	.00	13.44	1.97	5.23	2.51	1.25	.18	.18	.18	.18	.18	.18	.18	.18	.18
10- UP	17.74	4.86	3.54	.72	.54	.18	.18	32.97	5.73	4.48	3.05	1.08	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	24.55	17.20	5.91	1.97	.72	.36	.36	53.41	8.96	13.44	8.60	4.66	.72	.18	.18	.18	.18	.18	.18	.18	.18
KSC PEAK WINDS																					
LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	1 TO 4	5 TO 9
1 TO 4	1.79	3.41	1.61	1.25	.00	.00	.00	7.53	.90	2.69	2.69	2.33	.36	.00	.18	.18	.18	.18	.18	.18	.18
5 TO 9	5.22	4.48	.72	.54	.18	.00	.00	10.22	2.69	2.69	3.76	1.25	.54	.00	.18	.18	.18	.18	.18	.18	.18
10- UP	17.74	11.83	4.86	1.08	.18	.00	.00	34.75	6.99	6.45	2.87	1.61	1.08	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	24.55	19.71	6.99	2.87	.36	.18	.18	52.69	10.57	11.83	9.32	5.20	1.97	.36	.18	.18	.18	.18	.18	.18	.18

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KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF JAN.		NUMBER OBS.		558		RUNWAY 15		*** CROSSWIND LIMITS ***		25- UP		ZERO CROSS		TOTAL	
HOUR 12		HOUR 13		HOUR 14		HOUR 15		HOUR 16		HOUR 17		HOUR 18		HOUR 19		HOUR 20		HOUR 21	
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54	0	0.54
1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54	1	0.54
0	0.54	0	0.54	0	0.54	0	0.54	0</											

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TABLE 1.3. (Continued)

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KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF JAN.										MONTH OF JAN.									
HOUR 17										HOUR 17									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***				
1 10 4 5 TO 9					1 10 4 5 TO 9					1 10 4 5 TO 9					1 10 4 5 TO 9				
PERCENTAGES					PERCENTAGES					PERCENTAGES					PERCENTAGES				
1	1	1	1	4	1	1	1	1	4	1	1	1	1	4	1	1	1	1	4
3.58	5.73	1.79	.54	.18	3.58	5.73	1.79	.54	.18	3.58	5.73	1.79	.54	.18	3.58	5.73	1.79	.54	.18
5.10	5.38	2.33	.90	.00	5.10	5.38	2.33	.90	.00	5.10	5.38	2.33	.90	.00	5.10	5.38	2.33	.90	.00
13.44	8.24	3.05	1.61	.72	13.44	8.24	3.05	1.61	.72	13.44	8.24	3.05	1.61	.72	13.44	8.24	3.05	1.61	.72
23.97	19.35	7.17	3.05	.90	23.97	19.35	7.17	3.05	.90	23.97	19.35	7.17	3.05	.90	23.97	19.35	7.17	3.05	.90
TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
12.19	13.62	13.88	38.89		12.19	13.62	13.88	38.89		12.19	13.62	13.88	38.89		12.19	13.62	13.88	38.89	

TABLE 1.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF JAN.											
HOUR 16		NUMBER OBS. 558											
TAILWIND LIMITS	1 TO 4 5 TO 9 10- UP TOTAL	*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					ZERO CROSS	TOTAL
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24					1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24						
		PERCENTAGES					PERCENTAGES						
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24					1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24						
		PERCENTAGES					PERCENTAGES						
1 TO 4	14.30	3.76	1.43	1.25	.00	1.97	18.82	7.35	4.66	1.08	.00	1.25	15.41
5 TO 9	6.27	2.87	1.79	.54	.00	3.41	15.05	5.56	3.41	1.61	.36	3.05	14.16
10- UP	12.19	5.41	2.15	1.79	.18	.18	20.25	4.30	2.87	.18	.00	.72	8.06
TOTAL	28.85	13.04	5.38	3.56	.36	5.56	54.12	17.20	10.93	2.87	.36	5.02	37.63
		ZERO CROSS		*** CROSSWIND LIMITS ***									
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP		PERCENTAGES									
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TABLE 1.3. (Concluded)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF JAN.		NUMBER OBS. 558		HOUR 21		HOUR 22		HOUR 23	
		RUNWAY 15										HOUR 24		HOUR 25		HOUR 26		HOUR 27			
		*** CROSSWIND LIMITS ***										HOUR 28		HOUR 29		HOUR 30		HOUR 31			
		PERCENTAGES										HOUR 32		HOUR 33		HOUR 34		HOUR 35			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 36		HOUR 37		HOUR 38		HOUR 39			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 40		HOUR 41		HOUR 42		HOUR 43			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 44		HOUR 45		HOUR 46		HOUR 47			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 48		HOUR 49		HOUR 50		HOUR 51			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 52		HOUR 53		HOUR 54		HOUR 55			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 56		HOUR 57		HOUR 58		HOUR 59			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 60		HOUR 61		HOUR 62		HOUR 63			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 64		HOUR 65		HOUR 66		HOUR 67			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 68		HOUR 69		HOUR 70		HOUR 71			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 72		HOUR 73		HOUR 74		HOUR 75			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 76		HOUR 77		HOUR 78		HOUR 79			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 80		HOUR 81		HOUR 82		HOUR 83			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 84		HOUR 85		HOUR 86		HOUR 87			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 88		HOUR 89		HOUR 90		HOUR 91			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 92		HOUR 93		HOUR 94		HOUR 95			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 96		HOUR 97		HOUR 98		HOUR 99			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 100		HOUR 101		HOUR 102		HOUR 103			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 104		HOUR 105		HOUR 106		HOUR 107			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 108		HOUR 109		HOUR 110		HOUR 111			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 112		HOUR 113		HOUR 114		HOUR 115			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 116		HOUR 117		HOUR 118		HOUR 119			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 120		HOUR 121		HOUR 122		HOUR 123			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 124		HOUR 125		HOUR 126		HOUR 127			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 128		HOUR 129		HOUR 130		HOUR 131			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 132		HOUR 133		HOUR 134		HOUR 135			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 136		HOUR 137		HOUR 138		HOUR 139			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 140		HOUR 141		HOUR 142		HOUR 143			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 144		HOUR 145		HOUR 146		HOUR 147			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 148		HOUR 149		HOUR 150		HOUR 151			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 152		HOUR 153		HOUR 154		HOUR 155			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 156		HOUR 157		HOUR 158		HOUR 159			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 160		HOUR 161		HOUR 162		HOUR 163			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 164		HOUR 165		HOUR 166		HOUR 167			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 168		HOUR 169		HOUR 170		HOUR 171			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 172		HOUR 173		HOUR 174		HOUR 175			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 176		HOUR 177		HOUR 178		HOUR 179			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 180		HOUR 181		HOUR 182		HOUR 183			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 184		HOUR 185		HOUR 186		HOUR 187			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 188		HOUR 189		HOUR 190		HOUR 191			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 192		HOUR 193		HOUR 194		HOUR 195			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 196		HOUR 197		HOUR 198		HOUR 199			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 200		HOUR 201		HOUR 202		HOUR 203			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 204		HOUR 205		HOUR 206		HOUR 207			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 208		HOUR 209		HOUR 210		HOUR 211			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 212		HOUR 213		HOUR 214		HOUR 215			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 216		HOUR 217		HOUR 218		HOUR 219			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 220		HOUR 221		HOUR 222		HOUR 223			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 224		HOUR 225		HOUR 226		HOUR 227			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 228		HOUR 229		HOUR 230		HOUR 231			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 232		HOUR 233		HOUR 234		HOUR 235			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 236		HOUR 237		HOUR 238		HOUR 239			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 240		HOUR 241		HOUR 242		HOUR 243			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 244		HOUR 245		HOUR 246		HOUR 247			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 248		HOUR 249		HOUR 250		HOUR 251			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 252		HOUR 253		HOUR 254		HOUR 255			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 256		HOUR 257		HOUR 258		HOUR 259			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 260		HOUR 261		HOUR 262		HOUR 263			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 264		HOUR 265		HOUR 266		HOUR 267			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 268		HOUR 269		HOUR 270		HOUR 271			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 272		HOUR 273		HOUR 274		HOUR 275			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 276		HOUR 277		HOUR 278		HOUR 279			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 280		HOUR 281		HOUR 282		HOUR 283			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 284		HOUR 285		HOUR 286		HOUR 287			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 288		HOUR 289		HOUR 290		HOUR 291			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 292		HOUR 293		HOUR 294		HOUR 295			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 296		HOUR 297		HOUR 298		HOUR 299			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 300		HOUR 301		HOUR 302		HOUR 303			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 304		HOUR 305		HOUR 306		HOUR 307			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 308		HOUR 309		HOUR 310		HOUR 311			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 312		HOUR 313		HOUR 314		HOUR 315			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 316		HOUR 317		HOUR 318		HOUR 319			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 320		HOUR 321		HOUR 322		HOUR 323			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 324		HOUR 325		HOUR 326		HOUR 327			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 328		HOUR 329		HOUR 330		HOUR 331			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 332		HOUR 333		HOUR 334		HOUR 335			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 336		HOUR 337		HOUR 338		HOUR 339			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 340		HOUR 341		HOUR 342		HOUR 343			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 344		HOUR 345		HOUR 346		HOUR 347			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 348		HOUR 349		HOUR 350		HOUR 351			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 352		HOUR 353		HOUR 354		HOUR 355			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 356		HOUR 357		HOUR 358		HOUR 359			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 360		HOUR 361		HOUR 362		HOUR 363			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 364		HOUR 365		HOUR 366		HOUR 367			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 368		HOUR 369		HOUR 370		HOUR 371			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 372		HOUR 373		HOUR 374		HOUR 375			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 376		HOUR 377		HOUR 378		HOUR 379			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 380		HOUR 381		HOUR 382		HOUR 383			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 384		HOUR 385		HOUR 386		HOUR 387			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 388		HOUR 389		HOUR 390		HOUR 391			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 392		HOUR 393		HOUR 394		HOUR 395			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 396		HOUR 397		HOUR 398		HOUR 399			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 400		HOUR 401		HOUR 402		HOUR 403			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 404		HOUR 405		HOUR 406		HOUR 407			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 408		HOUR 409		HOUR 410		HOUR 411			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 412		HOUR 413		HOUR 414		HOUR 415			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 416		HOUR 417		HOUR 418		HOUR 419			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 420		HOUR 421		HOUR 422		HOUR 423			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 424		HOUR 425		HOUR 426		HOUR 427			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 428		HOUR 429		HOUR 430		HOUR 431			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 432		HOUR 433		HOUR 434		HOUR 435			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 436		HOUR 437		HOUR 438		HOUR 439			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 440		HOUR 441		HOUR 442		HOUR 443			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 444		HOUR 445		HOUR 446		HOUR 447			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 448		HOUR 449		HOUR 450		HOUR 451			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 452		HOUR 453		HOUR 454		HOUR 455			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 456		HOUR 457		HOUR 458		HOUR 459			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 460		HOUR 461		HOUR 462		HOUR 463			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 464		HOUR 465		HOUR 466		HOUR 467			
		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										HOUR 468		HOUR 469		HOUR 470		HOUR 471			

KSC PEAK WINDS				KSC RUNWAY 15 ***				KSC RUNWAY 33 ***			
HEADWIND TO TAILWIND REVERSALS				GIVEN A HEADWIND				GIVEN A HEADWIND			
MONTH OF JAN.				RESULTANT TAILWIND MAGNITUDE				RESULTANT TAILWIND MAGNITUDE			
				> 8				> 8			
				4 - 8				4 - 8			
				TOTAL				TOTAL			
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TABLE 1.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY CLASS (NOTES)	MSL PEAK WINDS		HEADWIND CUMULATIVE PERCENTAGE FREQUENCY												MONTH OF	
			JAN.													
	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF
0-1	27.83	20.21	19.49	20.38	21.80	14.96	15.24	15.63	16.45	14.96	15.24	15.63	16.45	14.96	15.24	15.63
1-2	36.23	26.21	24.30	27.26	28.27	18.31	19.08	19.58	21.02	18.31	19.08	19.58	21.02	18.31	19.08	19.58
2-3	43.34	30.38	28.96	30.96	32.52	20.71	22.62	23.48	26.74	20.71	22.62	23.48	26.74	20.71	22.62	23.48
3-4	50.14	35.20	30.13	35.80	37.43	23.97	24.29	26.94	32.45	23.97	24.29	26.94	32.45	23.97	24.29	26.94
4-5	61.74	41.59	33.54	39.11	43.44	26.17	26.75	30.72	39.14	26.17	26.75	29.93	39.14	26.17	26.75	29.93
5-6	67.68	47.59	38.23	45.35	49.14	30.68	31.47	36.20	47.14	30.68	31.47	34.35	47.14	30.68	31.47	34.35
6-7	71.30	54.41	41.14	49.68	53.07	33.37	33.82	39.54	51.98	33.37	33.82	37.68	51.98	33.37	33.82	37.68
7-8	73.62	55.93	44.68	54.39	56.63	37.39	37.36	43.62	56.73	37.39	37.36	41.61	56.73	37.39	37.36	41.61
8-9	76.96	60.23	49.75	58.47	60.85	42.09	41.40	46.67	63.24	42.09	41.40	46.42	63.24	42.09	41.40	46.42
9-10	82.32	67.01	56.64	67.52	71.97	48.32	48.08	55.00	69.74	48.32	48.08	52.31	69.74	48.32	48.08	52.31
10-11	84.78	71.84	61.65	71.21	76.15	53.02	51.33	58.40	72.56	53.02	51.33	55.15	72.56	53.02	51.33	55.15
11-12	86.67	76.01	67.47	75.80	80.31	61.09	54.18	62.55	76.52	61.09	54.18	60.35	76.52	61.09	54.18	60.35
12-13	90.14	80.16	73.42	78.73	84.14	68.26	62.73	70.99	81.79	68.26	62.73	69.97	81.79	68.26	62.73	69.97
13-14	91.89	83.18	77.72	84.71	89.97	74.98	72.52	74.24	84.78	74.98	72.52	72.52	84.78	74.98	72.52	72.52
14-15	93.77	87.09	81.27	88.41	92.48	78.81	74.83	77.49	88.48	78.81	74.83	80.57	88.48	78.81	74.83	80.57
15-16	94.35	89.57	85.44	91.08	94.49	82.74	83.22	81.88	91.20	82.74	83.22	83.22	91.20	82.74	83.22	83.22
16-17	95.65	93.09	88.35	93.25	96.41	86.13	86.63	86.93	92.96	86.13	86.63	86.63	92.96	86.13	86.63	86.63
17-18	96.52	95.16	91.14	95.41	96.41	89.74	89.40	89.78	94.46	89.74	89.40	89.40	94.46	89.74	89.40	89.40
18-19	97.83	96.61	94.68	96.60	97.59	91.37	91.94	91.46	95.87	91.37	91.94	91.94	95.87	91.37	91.94	91.94
19-20	98.26	98.17	96.58	97.45	98.78	94.34	95.81	93.88	96.48	94.34	95.81	95.81	96.48	94.34	95.81	95.81
20-21	98.55	98.71	97.97	98.39	99.11	95.88	96.76	96.89	97.51	95.88	96.76	96.76	97.51	95.88	96.76	96.76
21-22	98.84	99.35	98.61	98.34	99.11	97.51	97.35	97.75	98.33	97.51	97.35	97.35	98.33	97.51	97.35	97.35
22-23	99.71	99.35	98.61	98.34	99.11	97.51	97.35	97.75	98.33	97.51	97.35	97.35	98.33	97.51	97.35	97.35
23-24	99.86	99.87	99.11	99.11	99.49	99.70	99.70	99.70	99.70	99.70	99.70	99.70	99.70	99.70	99.70	99.70
24-25	99.86	100.00	99.75	99.62	99.84	99.84	99.84	99.84	99.84	99.84	99.84	99.84	99.84	99.84	99.84	99.84
25-26	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
26-27	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
27-28	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
28-29	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
29-30	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
30-31	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
31-32	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
32-33	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
33-34	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
34-35	100.00	100.00	99.87	99.75	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97
NOBS	690	767	790	785	3332	1043	1017	4216	1137	1043	1017	1019	1137	1043	1017	4216

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TABLE 2.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

MUN#AY 15 - 33		KSC PEAK #INDS		CROSSWINDS		TOTAL NUMBER OBS.		
		MONTH OF FEB.						
HRS	1 TO 4	CROSSWIND					ZERO CROSSWIND	
		***** CRITICAL LIMITS IN KNOTS *****						
	5 TO 9	10 TO 14	15 IC 19	2_ TO 24	25 ABOVE			
		PERCENTAGES						
00-02	34.68	27.11	10.02	3.67	.72	.39	18.41	1527
03-05	44.20	24.36	10.28	2.88	.39	.59	17.29	1527
06-08	44.27	24.36	10.28	2.62	.52	.52	17.42	1527
09-11	24.47	33.27	15.98	5.96	2.23	1.11	11.98	1527
12-14	25.28	33.27	16.27	6.38	2.62	2.36	9.63	1527
15-17	26.20	37.79	14.60	6.35	2.75	2.16	10.15	1527
18-20	40.97	26.53	9.64	3.14	1.31	1.70	16.70	1527
21-23	40.69	23.98	9.90	4.06	1.57	.59	19.00	1526
24-26	37.02	28.33	14.25	4.63	1.54	1.18	15.05	1215

TABLE 2.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

MMS	MUNRAY 15				KSC PEAK				TAILWINDS			
	TAILWIND				MONTH OF FEB.				TAILWIND			
	CRITICAL LIMITS IN KNOTS				TOTAL				CRITICAL LIMITS IN KNOTS			
	1 TO 4	5 TO 9	10 ABOVE	PERCENTAGES	NUMBER	OPS.	1 TO 4	5 TO 9	10 ABOVE	PERCENTAGES		
00-02	19.58	16.18	16.83	1527	1527	14.508	13.69	10.15				
03-05	18.86	18.86	18.27	1527	1527	16.24	10.41	7.66				
06-08	18.86	17.42	21.09	1527	1527	15.52	8.58	9.17				
09-11	8.78	13.56	31.24	1527	1527	8.97	9.63	19.32				
12-14	6.88	11.66	32.87	1527	1527	7.73	8.51	24.17				
15-17	8.78	13.62	28.42	1527	1527	7.40	11.85	21.68				
18-20	13.88	14.87	19.65	1527	1527	14.34	12.25	15.65				
21-23	15.92	16.51	16.84	1526	1526	14.09	12.98	13.76				
00-23	13.93	15.33	23.15	12215	12215	12.30	10.99	15.19				

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF FEB.										MONTH OF FEB.									
HOUR 0										HOUR 0									
NUMBER OBS. 509										NUMBER OBS. 509									
KUNWAY 45										KUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP										1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL		
1 TO 4	10.41	6.48	1.18	.79	.00	.00	1.57	20.43	*	7.07	3.93	.00	.59	.00	.00	.98	12.57		
5 TO 9	5.70	4.12	1.96	1.16	.20	.20	2.55	16.11	*	5.30	3.73	1.96	.39	.00	.00	3.34	18.73		
10- UP	5.70	6.09	2.36	1.35	.39	.00	.39	16.31	*	4.52	2.75	2.16	.20	.20	.39	.20	10.41		
TOTAL	21.81	16.90	5.50	3.34	.59	.20	4.52	52.85	*	16.90	10.41	4.13	1.18	.20	.39	4.52	37.72		
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF FEB.										MONTH OF FEB.									
HOUR 1										HOUR 1									
NUMBER OBS. 509										NUMBER OBS. 509									
KUNWAY 15										KUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP										1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL		
1 TO 4	10.42	6.48	.98	.98	.00	.00	.79	19.25	*	8.04	4.13	.98	.39	.20	.00	1.18	15.52		
5 TO 9	4.72	4.32	2.16	.20	.00	.00	3.14	14.54	*	5.30	3.54	1.38	.39	.00	.20	2.16	12.97		
10- UP	6.08	4.72	3.73	.54	.00	.20	1.18	17.29	*	4.32	3.34	1.77	.20	.59	.00	.59	10.81		
TOTAL	21.81	15.52	6.68	1.77	.00	.20	5.11	51.96	*	18.27	11.00	4.13	.98	.79	.20	3.93	39.29		
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF FEB.										MONTH OF FEB.									
HOUR 2										HOUR 2									
NUMBER OBS. 509										NUMBER OBS. 509									
KUNWAY 15										KUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP										1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL		
1 TO 4	10.42	5.93	1.57	1.38	.00	.00	1.96	19.06	*	8.04	3.93	.39	.59	.00	.00	.59	14.15		
5 TO 9	7.86	5.11	1.18	.54	.00	.00	3.14	17.88	*	4.13	5.50	1.96	.00	.00	.00	1.77	13.36		
10- UP	5.70	6.68	2.95	.74	.39	.00	.39	16.91	*	4.52	2.36	1.38	.39	.20	.20	.20	9.23		
TOTAL	23.77	15.72	5.70	2.75	.39	.00	5.50	53.83	*	17.29	11.79	3.73	.98	.20	.20	2.55	36.74		

TABLE 2.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS																			
		MONTH OF FEB.																			
HOUR 3		NUMBER OBS. 509																			
				RUNWAY 15		*** CROSSWIND LIMITS ***															
						1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP		ZERO CROSS		TOTAL	
				PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES	
TAILWIND LIMITS		ZERO CROSS		TOTAL *		25- UP		25- UP		25- UP		25- UP		25- UP		25- UP		25- UP		25- UP	
1 TO 4		11.00		3.54		.54		.00		.00		.00		.00		.00		.00		.00	
5 TO 9		9.24		3.54		.20		.00		.00		.00		.00		.00		.00		.00	
10- UP		5.69		7.66		.96		.20		.00		.00		.00		.00		.00		.00	
TOTAL		25.93		14.54		7.27		1.77		.20		.20		.20		.20		.20		.39	

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TAILWINDS VS CROSSWINDS
MONTH OF FEB.

TABLE 2.3. (Continued)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF FEB.										MONTH OF FEB.									
HOUR 9										HOUR 9									
NUMBER OBS. 509										NUMBER OBS. 509									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP	TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP
1 TO 4	4.72	2.75	1.77	.39	.00	.59	.59	10.22	* 2.55 5.70 1.77	.00	.00	.00	.00	.00	.00	.00	.00	11.79	.00
5 TO 9	6.09	3.73	1.57	.59	.00	.20	.20	14.93	* 2.55 2.36 .79	.39	.00	.00	.00	.00	.00	.00	.00	7.07	.39
10- UP	10.22	13.95	5.14	.90	.59	.20	.20	29.47	* 5.72 6.29 3.54	.59	.20	.20	.20	.20	.20	.20	.20	17.88	.59
TOTAL	21.07	20.43	6.48	1.96	.59	.39	.39	54.62	* 10.61 14.34 6.09	.98	.20	.20	.20	.20	.20	.20	.20	36.74	.98
HOUR 10										HOUR 10									
NUMBER OBS. 509										NUMBER OBS. 509									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
1 TO 4	1.77	2.95	1.57	1.57	.20	.20	.20	8.45	* .98 2.55 4.72	.00	.00	.00	.00	.00	.00	.00	.00	7.66	.00
5 TO 9	4.91	3.93	.98	.39	.20	.20	.20	12.36	* 2.55 3.93 3.34	.39	.00	.00	.00	.00	.00	.00	.00	11.20	.39
10- UP	13.56	11.20	4.13	1.33	.79	.39	.39	32.02	* 5.69 7.66 3.73	.79	.20	.20	.20	.20	.20	.20	.20	19.45	.79
TOTAL	20.24	18.07	6.68	3.34	1.18	.59	.59	52.85	* 9.43 14.15 9.62	2.55	.20	.20	.20	.20	.20	.20	.20	38.31	2.55
HOUR 11										HOUR 11									
NUMBER OBS. 509										NUMBER OBS. 509									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
1 TO 4	.79	2.75	2.55	.59	.20	.59	.20	7.66	* .59 2.36 2.36	.00	.00	.00	.00	.00	.00	.00	.00	7.47	.00
5 TO 9	3.73	5.70	2.16	.79	.20	.20	.20	13.36	* 1.96 2.95 2.95	.59	.00	.00	.00	.00	.00	.00	.00	10.61	.59
10- UP	12.47	10.81	5.50	1.16	.79	.39	.39	32.22	* 6.08 8.25 3.34	.79	.20	.20	.20	.20	.20	.20	.20	20.63	.79
TOTAL	17.49	19.25	10.22	2.55	1.18	1.18	1.18	53.24	* 9.43 13.56 8.64	4.13	.20	.20	.20	.20	.20	.20	.20	38.70	4.13

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TABLE 2.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS															
		MONTH OF FEB.															
HOUR 18		NUMBER OBS. 509															
		RUNWAY 33															
		*** CROSSWIND LIMITS ***															
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
		PERCENTAGES															
1 TO 4	3.54	5.70	.20	.20	.20	.20	.20	.20	10.81	6.29	5.50	1.18	.79	.00	.20	.20	14.15
5 TO 9	4.71	5.70	.39	.39	.39	.39	.39	1.57	15.13	5.11	2.16	1.18	.20	.00	.20	1.96	10.81
10- UP	11.00	6.68	.79	.79	.79	.79	.79	.39	22.40	11.59	3.54	.98	.59	.39	.20	.59	17.88
TOTAL	19.45	18.07	4.32	1.57	1.38	1.38	1.38	2.16	48.33	22.99	11.20	3.34	1.57	.39	.59	2.75	42.83
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS															
		MONTH OF FEB.															
HOUR 14		NUMBER OBS. 509															
		RUNWAY 33															
		*** CROSSWIND LIMITS ***															
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
		PERCENTAGES															
1 TO 4	10.02	2.75	1.38	.59	.39	.20	.39	.59	15.91	7.05	3.14	1.18	.39	.00	.20	.98	13.75
5 TO 9	5.30	3.54	2.36	.59	.20	.39	.20	2.36	18.73	7.47	1.57	1.18	.59	.00	.00	2.95	13.75
10- UP	9.02	4.72	1.57	.98	.40	.79	.20	.79	18.27	6.04	2.95	1.38	.20	.20	.20	.39	14.15
TOTAL	25.15	11.00	5.30	2.16	.79	1.38	1.38	3.14	48.92	24.17	7.66	3.73	1.18	.20	.39	4.32	41.65
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS															
		MONTH OF FEB.															
HOUR 20		NUMBER OBS. 509															
		RUNWAY 33															
		*** CROSSWIND LIMITS ***															
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
		PERCENTAGES															
1 TO 4	8.45	3.54	.98	.59	.20	.20	.20	.98	14.93	6.64	2.36	1.38	.39	.00	.20	2.16	15.13
5 TO 9	9.49	2.75	1.96	.79	.00	.39	.39	2.55	14.73	6.48	1.96	.98	.20	.00	.00	2.55	12.18
10- UP	7.66	5.30	3.14	.39	.79	.39	.39	.39	18.27	8.45	3.73	.79	.59	.20	.20	.98	14.93
TOTAL	27.59	11.59	6.09	1.77	.98	.98	.98	3.93	47.94	23.58	8.06	3.14	1.18	.20	.39	5.10	42.24

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TABLE 2.3. (Concluded)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS																			
MONTH OF FEB.										MONTH OF FEB.																			
HOUR 21										HOUR 21																			
RUNWAY 15										RUNWAY 33																			
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***														
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5										
PERCENTAGES										PERCENTAGES										PERCENTAGES									
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5										
7.07	4.32	.98	1.18	.20	1.18	1.18	.20	.00	.00	14.93	*	8.84	3.14	1.18	.20	.00	.00	.20	.00										
5.11	3.14	1.77	1.57	.59	2.36	2.36	.59	.20	.20	18.73	*	6.29	2.16	.98	.20	.20	.00	.00	.00										
8.85	3.93	2.95	1.38	.59	3.73	3.73	.59	.20	.20	17.68	*	8.45	3.54	1.57	.39	.00	.00	.00	.00										
20.63	11.39	5.70	4.13	1.38	3.39	3.39	1.38	.39	.39	47.35	*	23.58	8.84	3.73	.79	.20	.20	.20	.20										
TOTAL					TOTAL					TOTAL					TOTAL														
15.52					15.52					15.52					15.52														
12.57					12.57					12.57					12.57														
14.54					14.54					14.54					14.54														
42.63					42.63					42.63					42.63														

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HEADWIND TO TAILWIND REVERSALS
MONTH OF FEB.

MRS	*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	GIVEN A HEADWIND				GIVEN A HEADWIND			
	RESULTANT	TAILWIND	MAGNITUDE	TOTAL	RESULTANT	TAILWIND	MAGNITUDE	TOTAL
	> 0 - 3	4 - 8	> 8		> 0 - 3	4 - 8	> 8	
00-02	5.40	2.08	1.11	8.59	3.06	1.27	.11	4.44
03-05	5.95	1.93	.74	8.63	3.10	1.20	.30	4.60
06-08	4.91	1.23	.77	6.90	4.63	1.48	.30	6.43
09-11	3.39	1.69	1.97	7.05	3.70	2.43	.95	7.09
12-14	3.64	2.56	2.16	8.36	3.53	1.98	.99	6.50
15-17	1.73	1.20	1.73	4.66	4.12	.56	.89	5.56
18-20	3.68	.89	1.27	5.84	4.21	.80	.11	5.12
21-23	6.33	2.71	.65	9.69	3.33	1.55	.22	5.11
00-23	4.35	1.79	1.31	7.45	3.71	1.41	.48	5.60

TABLE 3.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33	KSC PEAK WINDS CROSSWINDS									
	MONTH OF MARCH									
	CROSSWIND									
HRS	***** CRITICAL LIMITS IN KNOTS *****									
	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND			
00-02	39.47	31.75	11.83	4.49	1.20	1.01	10.25			
03-05	44.85	30.42	10.25	3.29	.95	.76	9.49			
06-08	44.53	29.73	10.31	4.49	1.01	.89	9.04			
09-11	27.51	35.17	19.92	10.06	2.66	1.64	3.04			
12-14	24.35	31.37	23.72	11.13	4.81	3.73	.89			
15-17	21.70	34.09	24.73	9.61	4.74	4.11	1.01			
18-20	36.46	31.82	10.62	6.77	3.23	1.83	7.08			
21-23	41.27	27.72	11.58	6.20	2.41	1.01	9.81			
00-23	35.27	31.51	15.39	7.01	2.63	1.87	6.33			
							12647			

TABLE 3.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

RUNWAY 15	KSC PEAK WINDS TAILWINDS									
	MONTH OF MARCH									
	CROSSWIND									
HRS	***** CRITICAL LIMITS IN KNOTS *****									
	1 TO 4	5 TO 9	10 ABOVE	TOTAL				RUNWAY 33		
00-02	16.36	12.65	13.28	1581				TAILWIND		
03-05	17.84	15.24	13.79	1581				CRITICAL LIMITS IN KNOTS		
06-08	15.18	16.19	19.42	1581				1 TO 4		
09-11	7.15	10.56	28.46	1581				5 TO 9		
12-14	8.29	9.87	28.65	1581				PERCENTAGES		
15-17	9.68	10.56	24.10	1581				19.92	21.06	14.93
18-20	12.65	13.60	14.48	1581				21.38	17.65	12.14
21-23	15.32	15.12	11.08	1580				17.46	14.55	15.56
00-23	12.81	13.00	19.16	12647				9.11	12.27	31.82
								7.97	8.86	35.99
								10.94	12.52	32.01
								17.71	16.47	22.71
								18.61	19.24	19.37
								15.39	15.58	23.06

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TABLE 3.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS																			
TAILWINDS VS CROSSWINDS																			
MONTH OF MARCH																			
HOUR 0																			
NUMBER OBS. 527																			
RUNWAY 15																			
*** CROSSWIND LIMITS ***																			
PERCENTAGES																			
TAILWIND LIMITS	1	TO	4	5	TO	9	10	10	14	15	TO	19	20	TO	24	25-	UP	ZERO CROSS	TOTAL
1 TO 4	6.83	3.23	2.66	1.71	.00	.00	.76	15.18	10.63	4.55	2.28	.76	.38	.00	1.33	19.92			
5 TO 9	4.55	4.74	2.85	.57	.00	.57	1.71	14.99	8.73	4.55	2.47	.95	.57	.19	2.66	20.11			
10- UP	3.08	4.74	2.47	.95	.19	.19	.00	11.57	7.40	6.83	4.09	.19	.00	.19	.38	17.08			
TOTAL	14.42	12.71	7.97	3.23	.19	.76	2.47	41.75	26.76	15.94	6.83	1.90	.95	.38	4.36	57.12			
KSC PEAK WINDS																			
TAILWINDS VS CROSSWINDS																			
MONTH OF MARCH																			
HOUR 1																			
NUMBER OBS. 527																			
RUNWAY 33																			
*** CROSSWIND LIMITS ***																			
PERCENTAGES																			
TAILWIND LIMITS	1	TO	4	5	TO	9	10	10	14	15	TO	19	20	TO	24	25-	UP	ZERO CROSS	TOTAL
1 TO 4	6.45	5.12	1.14	1.33	.19	.19	1.33	15.75	8.73	5.69	2.09	1.14	.00	.00	2.28	19.92			
5 TO 9	4.55	4.17	2.09	.19	.19	.00	1.33	12.52	8.54	4.74	2.66	.76	.57	.19	3.61	21.06			
10- UP	4.74	6.83	1.14	.76	.76	.57	.00	14.80	6.07	5.50	1.90	.38	.00	.19	.19	14.23			
TOTAL	15.75	16.13	4.36	2.28	1.14	.76	2.66	43.07	23.34	15.94	6.64	2.28	.57	.36	6.07	55.22			
KSC PEAK WINDS																			
TAILWINDS VS CROSSWINDS																			
MONTH OF MARCH																			
HOUR 2																			
NUMBER OBS. 527																			
RUNWAY 33																			
*** CROSSWIND LIMITS ***																			
PERCENTAGES																			
TAILWIND LIMITS	1	TO	4	5	TO	9	10	10	14	15	TO	19	20	TO	24	25-	UP	ZERO CROSS	TOTAL
1 TO 4	7.97	7.40	1.33	.38	.00	.19	.95	18.22	9.11	5.69	2.28	.95	.00	.00	1.90	19.92			
5 TO 9	5.80	2.85	.76	.76	.00	.00	2.28	10.44	7.40	6.45	2.28	.95	.38	.38	4.17	22.01			
10- UP	4.36	6.45	1.52	.57	.38	.19	.00	13.47	5.50	5.69	1.52	.19	.00	.00	.57	13.47			
TOTAL	16.13	16.70	3.61	1.71	.38	.38	3.23	42.13	22.01	17.84	6.07	2.09	.38	.38	6.64	55.41			

TABLE 3.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF MARCH									
HOUR 3		NUMBER OBS. 527									
TAILWIND LIMITS	1 TO 4	RUNWAY 15									
		*** CROSSWIND LIMITS ***									
		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	0 1 TO 4	5 TO 9
		PERCENTAGES									
1 TO 4	8.73	6.45	1.52	.76	.38	.19	.00	.95	18.41	10.63	7.02
5 TO 9	6.45	3.98	.57	.38	.19	.00	.00	1.33	12.90	7.02	5.88
10- UP	4.36	4.93	3.04	.95	.38	.19	.00	.19	13.85	5.12	3.80
TOTAL	19.54	15.37	5.12	2.09	.57	.00	.00	2.47	45.16	22.77	16.70
		25- UP									
		PERCENTAGES									
		25- UP									
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		PERCENTAGES									

TABLE 3.3. (Continued)

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TABLE 3.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF MARCH		NUMBER OBS. 527		RUNWAY 33										ZERO CROSS		TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					TOTAL		*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					25- UP		25- UP		ZERO CROSS		TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19

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KSC PEAK WINDS										TAILWINDS VS CROSSWINDS												
HOUR 12										NUMBER OBS. 527												
RUNWAY 15										RUNWAY 33												
*** CROSSWIND LIMITS ***					ZERO					*** CROSSWIND LIMITS ***					ZERO							
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
PERCENTAGES										PERCENTAGES												
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
5	TO	9	10	1014	15	19	10	1014	15	TO	19	5	TO	9	10	1014	15	10	1014	15	TO	19
10	UP	10	1014	15	19	10	1014	15	TO	19	10	UP	10	1014	15	19	10	1014	15	TO	19	
TOTAL											TOTAL											
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
5	TO	9	10	1014	15	19	10	1014	15	TO	19	5	TO	9	10	1014	15	10	1014	15	TO	19
10	UP	10	1014	15	19	10	1014	15	TO	19	10	UP	10	1014	15	19	10	1014	15	TO	19	
TOTAL											TOTAL											
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
5	TO	9	10	1014	15	19	10	1014	15	TO	19	5	TO	9	10	1014	15	10	1014	15	TO	19
10	UP	10	1014	15	19	10	1014	15	TO	19	10	UP	10	1014	15	19	10	1014	15	TO	19	
TOTAL											TOTAL											
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
5	TO	9	10	1014	15	19	10	1014	15	TO	19	5	TO	9	10	1014	15	10	1014	15	TO	19
10	UP	10	1014	15	19	10	1014	15	TO	19	10	UP	10	1014	15	19	10	1014	15	TO	19	
TOTAL											TOTAL											
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
5	TO	9	10	1014	15	19	10	1014	15	TO	19	5	TO	9	10	1014	15	10	1014	15	TO	19
10	UP	10	1014	15	19	10	1014	15	TO	19	10	UP	10	1014	15	19	10	1014	15	TO	19	
TOTAL											TOTAL											
1	TO	4	5	TO	9	10	1014	15	TO	19	1	TO	4	5	TO	9	10	1014	15	TO	19	
5	TO	9	10	1014	15	19	10	1014	15	TO	19	5	TO	9	10	1014	15	10	1014	15	TO	19
10	UP	10	1014	15	19	10	1014	15	TO	19	10	UP	10	1014	15	19	10	1014	15	TO	19	
TOTAL											TOTAL											

TABLE 3.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF MARCH		NUMBER OBS. 527		RUNWAY 33										TOTAL		
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
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		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
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		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
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		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
		HOUR 15					HOUR 16					HOUR 17					HOUR 18					HOUR 19						
</																												

TABLE 3.3. (Continued)

TAILWIND LIMITS	KSC PEAK WINDS										TAILWINDS VS CROSSWINDS																					
	HOUR 18					HOUR 19					HOUR 20					HOUR 21																
	RUNWAY 15					RUNWAY 15					RUNWAY 15					RUNWAY 15																
	1	TO	4	5	TO	9	10	14	15	TO	19	20	10	14	15	TO	19	20	10	14	15	TO	19	20	10	14	15	TO	19	20	10	14
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***																	
PERCENTAGES					PERCENTAGES					PERCENTAGES					PERCENTAGES																	
1	TO	4	1.14	2.47	1.71	.76	.57	.19	9.30	*	2.66	6.83	3.23	1.14	.57	.38	1.71	16.89														
5	TO	9	2.28	5.12	1.52	1.14	.57	.57	12.71	*	3.04	7.97	2.09	1.33	.38	.38	1.71	16.89														
10	UP	4.74	8.16	2.66	1.14	.38	.00	.00	18.22	*	14.80	9.11	2.66	.57	.00	.00	.19	27.32														
TOTAL		8.16	15.475	6.64	3.36	1.52	.76	.76	40.23	*	20.49	23.91	7.97	3.04	.95	.38	2.28	59.58														
KSC PEAK WINDS					KSC PEAK WINDS					KSC PEAK WINDS					KSC PEAK WINDS																	
MONTH OF MARCH					MONTH OF MARCH					MONTH OF MARCH					MONTH OF MARCH																	
NUMBER OBS. 527					NUMBER OBS. 527					NUMBER OBS. 527					NUMBER OBS. 527																	
TAILWINDS VS CROSSWINDS					TAILWINDS VS CROSSWINDS					TAILWINDS VS CROSSWINDS					TAILWINDS VS CROSSWINDS																	
ZERO CROSS					ZERO CROSS					ZERO CROSS					ZERO CROSS																	
1	TO	4	4.74	4.93	.95	.76	.57	.76	14.80	*	9.68	5.12	1.52	.76	.38	.19	1.14	18.79														
5	TO	9	4.93	3.04	1.52	1.14	.76	.76	14.23	*	7.78	5.50	1.52	.38	.76	.19	3.98	20.11														
10	UP	4.17	3.48	2.09	1.33	.00	.19	.19	11.95	*	11.95	4.55	1.71	.38	.38	.00	.76	19.73														
TOTAL		13.85	11.95	4.55	1.52	.95	.38	.38	40.99	*	29.41	15.18	4.74	1.52	1.52	.38	5.88	58.63														

TABLE 3.3. (Concluded)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF MARCH										MONTH OF MARCH									
HOUR 21										NUMBER OBS. 527									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***				
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24					1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24					1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24					1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24				
PERCENTAGES					PERCENTAGES					PERCENTAGES					PERCENTAGES				
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL *	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	4.93	4.74	.95	1.71	.19	.38	.95	13.85	*	8.35	4.74	1.33	.76	.57	1.14	17.65			
5 TO 9	6.45	3.04	2.09	.95	.95	.00	2.28	15.75	*	7.21	4.36	1.90	.95	.00	3.61	18.22			
10- UP	3.48	3.48	2.28	1.52	.38	.19	.19	12.52	*	11.76	5.88	2.09	.19	.00	.76	20.68			
TOTAL	15.37	11.76	5.31	4.17	1.52	.57	3.42	42.13	*	27.32	14.99	5.31	1.90	.57	5.50	56.55			

ASC PEAK WINDS										TAILWINDS VS CROSSWINDS										TAILWINDS VS CROSSWINDS									
MONTH OF MARCH										MONTH OF MARCH										MONTH OF MARCH									
HOUR 22										NUMBER OBS. 526										NUMBER OBS. 526									
RUNWAY 15										RUNWAY 33										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24									
PERCENTAGES										PERCENTAGES										PERCENTAGES									
1 TO 4	5.51	5.13	.76	2.09	.19	15.97	9.32	4.56	.76	1.14	1.33	.00	1.14	18.25															
5 TO 9	3.99	3.80	2.28	.95	.76	14.83	6.94	5.89	2.28	.57	.19	.19	2.28	20.34															
10- UP	3.04	3.04	2.28	1.52	.38	10.65	10.84	5.32	1.71	.76	.00	.00	.36	19.01															
TOTAL	12.55	11.98	5.32	4.56	1.33	41.44	29.09	15.78	4.75	2.47	1.52	.19	3.80	57.60															

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF MARCH										MONTH OF MARCH									
HOUR 23										NUMBER OBS. 527									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS										TOTAL *									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										ZERO CROSS									
1 TO 4	5.69	4.36	2.28	1.33	.57	.19	1.71	.19	1.71	16.13	*	9.11	5.50	1.71	.00	.19	1.71	19.92	
5 TO 9	4.74	3.98	3.04	.57	.38	.38	2.28	.38	2.28	15.37	*	7.21	6.26	2.09	.57	.19	2.28	19.17	
10- UP	3.23	4.17	1.50	.36	.19	.19	4.36	.19	4.36	10.26	*	9.49	4.36	3.04	.95	.19	.00	18.41	
TOTAL	13.66	12.52	7.21	2.28	1.14	.76	3.99	.58	4.36	41.56	*	25.81	16.13	6.83	3.23	.76	.58	57.50	

TABLE 3.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END

MRS	MSC PEAK WINDS		HEAD/TAIL WIND REVERSALS		MONTH OF		MONTH OF		MONTH OF		MONTH OF	
	15 ***		33 ***		15 ***		33 ***		15 ***		33 ***	
	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS
DU-02	8.94	5.01	3.93	8.68	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28
U3-05	7.24	4.63	2.92	8.69	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.23
U6-08	8.67	3.93	4.94	7.97	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
U9-11	7.41	3.49	3.93	6.48	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
12-14	9.00	4.31	4.69	8.10	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01
15-17	9.06	3.80	5.26	6.84	11.84	11.84	11.84	11.84	11.84	11.84	11.84	11.84
18-20	8.75	4.69	4.06	7.92	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94
21-23	9.06	4.44	4.63	7.62	11.06	11.06	11.06	11.06	11.06	11.06	11.06	11.06
DU-23	8.58	4.29	4.29	7.79	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55

3.4A

HEADWIND TO TAILWIND REVERSALS
MONTH OF MARCH

MRS	MSC PEAK WINDS		HEADWIND TO TAILWIND REVERSALS		MONTH OF		MONTH OF		MONTH OF		MONTH OF	
	15 ***		33 ***		15 ***		33 ***		15 ***		33 ***	
	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS
DU-02	5.93	2.53	2.22	8.68	9.28	9.28	9.28	9.28	9.28	9.28	9.28	9.28
U3-05	5.83	2.02	0.83	8.69	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.23
U6-08	5.78	1.90	1.29	7.97	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
U9-11	3.65	1.30	1.53	6.48	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
12-14	4.29	1.67	2.15	8.10	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01
15-17	4.22	1.37	1.25	6.84	11.84	11.84	11.84	11.84	11.84	11.84	11.84	11.84
18-20	4.71	1.82	1.39	7.92	9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94
21-23	5.33	1.74	0.54	7.62	11.06	11.06	11.06	11.06	11.06	11.06	11.06	11.06
DU-23	4.97	1.68	1.14	7.79	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55

3.4B

TABLE 3.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY COMPONENT CLASS (KNOTS)	HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF MARCH											
	KSC PEAK WINDS				*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 06-17 CPF	HOURS 06-17 CPF	HOURS 06-17 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
U-1	7.33	2.70	2.26	3.30	3.42	10.09	12.30	9.46	9.32	2.55	2.84	4.44
1-2	14.27	7.87	6.68	9.89	10.09	19.51	19.51	9.46	9.46	10.05	9.80	10.47
4-3	22.49	11.16	11.77	13.30	19.51	28.51	28.51	11.89	11.89	13.00	14.77	14.84
3-4	30.08	14.22	13.67	17.27	28.51	37.51	37.51	13.78	13.78	15.82	17.61	18.38
4-5	38.82	18.10	15.70	20.00	37.51	46.51	46.51	16.62	16.62	18.36	22.16	22.59
5-6	44.22	20.92	18.07	23.64	46.51	55.51	55.51	21.35	21.35	23.46	26.85	28.02
6-7	51.03	24.32	21.40	27.84	55.51	64.51	64.51	25.00	25.00	26.41	30.68	31.77
7-8	55.78	27.61	23.42	30.45	64.51	73.51	73.51	27.84	27.84	29.49	35.23	36.30
8-9	60.41	32.43	26.99	35.11	73.51	82.51	82.51	31.89	31.89	33.91	39.35	40.41
9-10	68.34	40.89	32.34	42.50	82.51	91.51	91.51	39.19	39.19	39.28	45.88	47.30
10-11	72.37	45.12	36.62	46.82	91.51	100.00	100.00	41.97	41.97	41.97	51.44	51.44
11-12	77.38	51.00	42.57	51.59	100.00	100.00	100.00	47.97	47.97	47.97	55.34	55.34
12-13	81.49	57.11	49.94	55.57	100.00	100.00	100.00	52.43	52.43	52.01	60.80	60.80
13-14	85.86	63.92	57.19	60.57	100.00	100.00	100.00	57.70	57.70	57.91	65.34	65.34
14-15	89.33	70.04	61.95	64.77	100.00	100.00	100.00	63.38	63.38	64.21	70.17	69.69
15-16	91.13	75.15	66.23	69.20	100.00	100.00	100.00	66.89	66.89	67.96	74.01	72.87
16-17	94.09	81.08	72.18	73.86	100.00	100.00	100.00	70.81	70.81	72.39	76.99	76.48
17-18	95.63	85.90	78.15	78.07	100.00	100.00	100.00	75.00	75.00	76.68	80.82	80.06
18-19	96.66	87.07	82.39	82.39	100.00	100.00	100.00	80.54	80.54	81.04	84.66	84.40
19-20	98.46	92.46	85.26	86.70	100.00	100.00	100.00	86.35	86.35	87.27	87.78	88.67
20-21	98.84	94.59	88.98	88.98	100.00	100.00	100.00	88.24	88.24	89.95	89.63	90.53
21-22	99.10	96.24	90.56	92.16	100.00	100.00	100.00	91.76	91.76	92.09	91.76	92.88
22-23	99.23	97.68	92.98	93.64	100.00	100.00	100.00	94.19	94.19	95.04	93.47	94.97
23-24	99.49	98.94	95.96	96.02	100.00	100.00	100.00	95.81	95.81	96.38	95.45	96.86
24-25	99.61	99.53	96.43	96.93	100.00	100.00	100.00	97.16	97.16	97.45	97.28	97.28
25-26	99.76	99.76	96.10	98.41	100.00	100.00	100.00	97.70	97.70	98.39	97.59	98.24
26-27	100.00	99.88	98.69	98.64	100.00	100.00	100.00	98.65	98.65	98.53	98.44	98.81
27-28	100.00	99.88	99.17	99.32	100.00	100.00	100.00	99.46	99.46	99.20	99.28	99.28
28-29	100.00	100.00	99.76	99.55	100.00	100.00	100.00	99.60	99.60	99.60	99.50	99.50
29-30	100.00	100.00	99.76	99.89	100.00	100.00	100.00	99.87	99.87	99.87	99.64	99.64
30-31	100.00	100.00	99.88	100.00	100.00	100.00	100.00	99.86	99.86	99.86	99.80	99.80
31-32	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.57	99.57
32-33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.72	99.72
33-34	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
34-35	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
35-36	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
36-37	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
37-38	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
38-39	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
39-40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
40-41	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
41-42	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
42-43	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	99.93
N085	778	851	841	880	3350	829	740	746	704	301.9		

TABLE 4.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33	KSC PEAK WINDS MONTH OF APRIL									
	CROSSWIND									
	***** CRITICAL LIMITS IN KNOTS *****									
HRS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND			
										TOTAL NUMBER OBS.
00-02	35.56	34.14	14.53	6.43	1.24	.19	7.92			1617
03-05	38.78	32.41	12.55	5.07	.93	.25	10.02			1617
06-08	35.17	33.93	15.70	6.24	1.30	.31	7.35			1618
09-11	23.52	33.27	26.42	11.60	2.22	1.23	1.73			1620
12-14	17.96	27.41	34.38	14.81	3.64	1.23	.56			1620
15-17	14.63	34.63	32.84	12.90	3.27	.99	.74			1620
18-20	32.69	37.52	16.13	6.37	1.67	.31	5.32			1618
21-23	38.34	27.83	15.58	6.68	1.42	.19	9.96			1617
00-23	29.57	32.64	21.02	6.77	1.96	.59	5.45			12947

TABLE 4.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

RUNWAY 15	KSC PEAK WINDS MONTH OF APRIL									
	TAILWIND									
	***** CRITICAL LIMITS IN KNOTS *****									
HRS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	TOTAL NUMBER OBS.			
										TOTAL NUMBER OBS.
00-02	16.02	11.07	7.24				1617			1617
03-05	17.87	12.06	8.41				1618			1618
06-08	16.56	12.42	12.86				1620			1620
09-11	8.89	10.74	19.44				1620			1620
12-14	8.52	6.67	18.58				1620			1620
15-17	8.15	6.98	15.49				1618			1618
18-20	11.19	7.85	9.64				1617			1617
21-23	11.50	11.07	5.94				12947			12947
00-23	12.33	9.86	12.20							

RUNWAY 33		TAILWIND	
CRITICAL LIMITS IN KNOTS		PERCENTAGES	
1 TO 4	5 TO 9	10 ABOVE	
22.14	24.43	18.31	
25.73	21.09	13.11	
22.00	18.60	16.81	
12.78	15.06	32.84	
13.46	15.06	37.47	
13.15	18.58	37.28	
18.42	25.65	26.45	
21.71	25.73	22.88	
18.67	20.52	25.65	

TABLE 4.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES B. RUNWAY END

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 0										HOUR 1									
NUMBER OBS. 539										NUMBER OBS. 539									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	5.57	5.38	2.60	.93	.00	.19	1.11	15.77	10.39	9.82	1.86	1.67	.19	.00	1.86	20.78	1.86	20.78	1.86
5 TO 9	1.67	3.90	3.15	.37	.19	.00	1.30	10.58	10.02	6.86	3.71	.93	.37	.00	3.71	2.78	2.78	2.78	2.78
10- UP	2.14	2.60	1.46	.37	.19	.00	.19	6.86	7.42	7.05	3.34	2.23	.00	.19	3.34	.37	.37	.37	.37
TOTAL	9.28	11.87	7.24	1.67	.37	.19	2.60	33.21	27.83	18.74	8.91	4.82	.56	.19	8.91	5.01	5.01	5.01	5.01
KSC PEAK WINDS										KSC PEAK WINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 1										HOUR 2									
NUMBER OBS. 539										NUMBER OBS. 539									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	5.01	7.42	1.86	.74	.19	.00	.37	15.58	10.19	6.68	1.86	.93	.37	.00	1.86	2.23	2.23	2.23	2.23
5 TO 9	3.53	2.60	2.41	.93	.19	.00	1.67	11.32	7.79	8.16	3.71	2.23	.19	.00	3.71	2.78	2.78	2.78	2.78
10- UP	2.23	3.34	1.30	.37	.19	.00	.00	7.42	6.12	6.31	3.53	1.48	.37	.00	3.53	.00	.00	.00	.00
TOTAL	10.76	13.36	5.57	2.04	.56	.00	2.04	34.32	24.30	21.15	9.09	4.64	.93	.00	9.09	5.01	5.01	5.01	5.01
KSC PEAK WINDS										KSC PEAK WINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 2										HOUR 3									
NUMBER OBS. 539										NUMBER OBS. 539									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	5.75	7.61	1.86	.74	.00	.19	.56	16.70	9.65	7.24	1.86	1.30	.37	.00	1.86	2.78	2.78	2.78	2.78
5 TO 9	3.53	4.08	2.04	.93	.00	.00	.74	11.32	8.91	7.98	2.97	1.48	.56	.00	2.97	1.86	1.86	1.86	1.86
10- UP	2.41	4.08	.56	.37	.00	.00	.00	7.42	4.27	6.31	3.53	1.30	.00	.00	3.53	.74	.74	.74	.74
TOTAL	11.69	15.77	4.45	2.04	.00	.19	1.30	35.44	22.82	21.52	8.35	4.08	1.00	.00	8.35	5.38	5.38	5.38	5.38

TABLE 4.3. (Continued)

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF APRIL			NUMBER OBS. 539			TAILWINDS VS CROSSWINDS			ZERO CROSS		
HOUR 3			TOTAL			1 TO 5 TO 9 101014 151019 201024 25- UP			TOTAL			1 TO 5 TO 9 101014 151019 201024 25- UP		
TAILWIND LIMITS			RUNWAY 15			CROSSWIND LIMITS			RUNWAY 33			CROSSWIND LIMITS		
1 TO 4			5 TO 9			101014 151019 201024 25- UP			101014 151019 201024 25- UP			101014 151019 201024 25- UP		
PERCENTAGES			PERCENTAGES			PERCENTAGES			PERCENTAGES			PERCENTAGES		
1 TO 4	6.31	7.24	1.67	1.33	.19	.37	17.25	11.32	7.98	1.48	.19	.00	2.60	24.68
5 TO 9	4.64	2.78	2.41	.37	.00	.93	11.13	6.12	8.72	2.78	1.11	.37	2.60	21.71
10- UP	5.90	2.97	1.11	.19	.00	.19	8.35	3.34	5.94	3.71	1.30	.00	.56	14.84
TOTAL	14.84	12.99	5.19	1.86	.19	1.48	36.73	20.78	22.63	7.98	3.53	.56	5.75	61.22

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF APRIL			NUMBER OBS. 539			TAILWINDS VS CROSSWINDS			ZERO CROSS		
HOUR 4			TOTAL			1 TO 5 TO 9 101014 151019 201024 25- UP			TOTAL			1 TO 5 TO 9 101014 151019 201024 25- UP		
TAILWIND LIMITS			RUNWAY 15			CROSSWIND LIMITS			RUNWAY 33			CROSSWIND LIMITS		
1 TO 4			5 TO 9			101014 151019 201024 25- UP			101014 151019 201024 25- UP			101014 151019 201024 25- UP		
PERCENTAGES			PERCENTAGES			PERCENTAGES			PERCENTAGES			PERCENTAGES		
1 TO 4	6.31	5.75	1.86	.93	.00	.423	17.25	13.17	7.24	1.86	1.67	.19	2.23	26.35
5 TO 9	4.45	2.04	2.60	.37	.19	.00	12.36	6.12	9.83	2.04	.74	.56	2.23	21.52
10- UP	5.53	3.34	1.11	.37	.19	.00	8.53	3.90	4.45	2.97	.56	.56	.19	12.62
TOTAL	14.29	11.13	5.57	1.67	.37	.19	37.85	23.19	21.52	6.86	2.97	1.30	.64	60.48

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF APRIL			NUMBER OBS. 539			TAILWINDS VS CROSSWINDS			ZERO CROSS		
HOUR 5			TOTAL			1 TO 5 TO 9 101014 151019 201024 25- UP			TOTAL			1 TO 5 TO 9 101014 151019 201024 25- UP		
TAILWIND LIMITS			RUNWAY 15			CROSSWIND LIMITS			RUNWAY 33			CROSSWIND LIMITS		
1 TO 4			5 TO 9			101014 151019 201024 25- UP			101014 151019 201024 25- UP			101014 151019 201024 25- UP		
PERCENTAGES			PERCENTAGES			PERCENTAGES			PERCENTAGES			PERCENTAGES		
1 TO 4	9.28	5.75	2.04	.74	.00	.19	19.11	14.66	6.49	1.67	.00	.19	1.48	26.16
5 TO 9	6.12	2.97	1.11	.19	.19	.00	12.99	6.68	6.86	2.41	.19	.00	2.78	20.04
10- UP	3.34	2.97	1.48	.37	.00	.19	8.35	3.15	3.90	3.34	.00	.00	.37	11.87
TOTAL	18.74	11.69	4.64	1.30	.19	.19	40.45	24.49	17.25	7.42	.19	.19	.64	58.07

TABLE 4.3. (Continued)

KSC PEAK WINDS									
TAILWINDS VS CROSSWINDS									
MONTH OF APRIL									
HOUR 6									
NUMBER OBS. 539									
RUNWAY 33									
*** CROSSWIND LIMITS ***									
PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	25- UP
1 TO 4	9.65	7.05	1.30	1.67	.37	.00	1.30	21.34	.00
5 TO 9	5.75	2.41	.93	.19	.19	.19	2.74	12.43	.00
10- UP	3.15	5.19	.93	.00	.00	.00	.00	9.28	.00
TOTAL	18.55	14.66	3.15	1.86	.56	.19	4.08	43.04	.37
KSC PEAK WINDS									
TAILWINDS VS CROSSWINDS									
MONTH OF APRIL									
HOUR 7									
NUMBER OBS. 539									
RUNWAY 33									
*** CROSSWIND LIMITS ***									
PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	25- UP
1 TO 4	8.16	4.82	2.41	.93	.00	.00	1.11	17.44	.19
5 TO 9	5.38	3.34	1.11	.56	.19	.19	1.86	12.62	.00
10- UP	4.64	5.57	1.67	.00	.00	.00	.37	12.24	.00
TOTAL	18.18	13.73	5.19	1.48	.19	.19	3.34	42.30	.19
KSC PEAK WINDS									
TAILWINDS VS CROSSWINDS									
MONTH OF APRIL									
HOUR 8									
NUMBER OBS. 540									
RUNWAY 33									
*** CROSSWIND LIMITS ***									
PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	25- UP
1 TO 4	2.59	3.33	2.59	1.48	.19	.00	.74	10.93	.19
5 TO 9	4.07	4.63	1.30	.37	.00	.19	1.67	12.22	.00
10- UP	5.93	7.78	2.41	.37	.00	.00	.56	17.04	.00
TOTAL	12.59	15.74	6.30	2.22	.19	.19	2.96	40.19	.19

TABLE 4.3. (Continued)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 9										HOUR 10									
NUMBER OBS. 540										NUMBER OBS. 540									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP	TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP
1 TO 4	.74	3.89	1.67	2.04	.37	.00	.19	8.89	* .74 4.44 6.30 2.22	1 TO 4	.74	3.89	1.67	2.04	.37	.00	.19	8.89	* .74 4.44 6.30 2.22
5 TO 9	4.07	4.63	1.48	.74	.19	.00	1.11	12.22	* 2.22 5.37 6.11 1.11	5 TO 9	4.07	4.63	1.48	.74	.19	.00	1.11	12.22	* 2.22 5.37 6.11 1.11
10- UP	7.96	7.59	2.41	.93	.00	.00	.00	18.89	* 9.26 9.81 6.11 2.78	10- UP	7.96	7.59	2.41	.93	.00	.00	.19	18.89	* 9.26 9.81 6.11 2.78
TOTAL	12.78	16.11	5.56	3.70	.56	.00	1.30	40.00	* 12.22 19.63 18.52 6.11	TOTAL	12.78	16.11	5.56	3.70	.56	.00	.74	59.81	* 12.22 19.63 18.52 6.11
KSC PEAK WINDS										KSC PEAK WINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 11										HOUR 10									
NUMBER OBS. 540										NUMBER OBS. 540									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP	TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP
1 TO 4	.56	3.15	3.33	1.30	.37	.00	.00	8.70	* .00 2.78 5.74 2.78	1 TO 4	.56	3.15	3.33	1.30	.37	.00	.00	11.85	* .00 2.78 5.74 2.78
5 TO 9	1.48	4.26	1.85	1.67	.00	.19	.74	10.19	* 2.04 4.07 5.37 2.04	5 TO 9	1.48	4.26	1.85	1.67	.00	.19	.37	14.81	* 2.04 4.07 5.37 2.04
10- UP	8.15	8.89	2.59	.74	.00	.00	.00	20.37	* 12.41 10.19 6.85 2.59	10- UP	8.15	8.89	2.59	.74	.00	.19	.56	33.70	* 12.41 10.19 6.85 2.59
TOTAL	10.19	16.30	7.78	3.70	.37	.19	.74	39.26	* 14.44 17.04 17.96 7.41	TOTAL	10.19	16.30	7.78	3.70	.37	.19	.56	60.37	* 14.44 17.04 17.96 7.41
KSC PEAK WINDS										KSC PEAK WINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 11										HOUR 11									
NUMBER OBS. 540										NUMBER OBS. 540									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP	TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	* 1 TO * 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP
1 TO 4	.00	2.22	3.15	2.59	.93	.19	.00	9.07	* .00 2.59 5.37 3.89	1 TO 4	.00	2.22	3.15	2.59	.93	.00	.00	12.04	* .00 2.59 5.37 3.89
5 TO 9	.74	3.89	3.70	.74	.19	.37	.19	9.81	* .93 4.07 5.74 2.04	5 TO 9	.74	3.89	3.70	.74	.19	.74	.56	14.26	* .93 4.07 5.74 2.04
10- UP	5.19	8.33	4.26	1.30	.00	.00	.00	19.07	* 14.07 9.63 7.22 3.33	10- UP	5.19	8.33	4.26	1.30	.00	.37	.37	35.56	* 14.07 9.63 7.22 3.33
TOTAL	5.93	14.44	11.11	4.63	1.11	.56	.19	37.96	* 15.00 16.30 18.33 9.26	TOTAL	5.93	14.44	11.11	4.63	1.11	.56	.93	61.85	* 15.00 16.30 18.33 9.26

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TABLE 4.3. (Continued)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 12										HOUR 12									
NUMBER OBS. 540										NUMBER OBS. 540									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	*	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
1 TO 4	.00	1.85	4.26	2.55	.74	.37	.00	9.81	*	.19	.93	5.37	5.37	.37	.19	.00	12.41		
5 TO 9	.56	1.85	3.49	1.30	.19	.19	.00	7.96	*	.37	3.52	6.85	2.22	.74	.37	.19	14.26		
10- UP	4.81	7.04	4.81	1.30	.19	.00	.19	18.33	*	15.74	10.74	6.67	2.41	.93	.19	.37	37.04		
TOTAL	5.37	10.74	12.96	5.19	1.11	.56	.19	36.11	*	16.30	15.19	18.89	10.00	2.04	.74	.56	63.70		
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 13										HOUR 13									
NUMBER OBS. 540										NUMBER OBS. 540									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	*	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
1 TO 4	.00	1.48	3.33	3.33	.37	.19	.00	8.73	*	.00	1.48	5.19	3.70	.93	.74	.00	12.04		
5 TO 9	.00	1.48	3.52	1.48	.37	.00	.00	6.85	*	.74	3.70	7.59	2.59	.74	.00	.00	15.37		
10- UP	3.33	7.78	5.74	1.48	.56	.00	.00	18.89	*	13.52	12.96	6.67	3.70	.56	.37	.19	37.96		
TOTAL	3.33	10.74	12.59	6.30	1.30	.19	.00	34.44	*	14.26	18.15	19.44	10.00	2.22	1.11	.19	65.37		
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF APRIL										MONTH OF APRIL									
HOUR 14										HOUR 14									
NUMBER OBS. 540										NUMBER OBS. 540									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	*	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
1 TO 4	.00	.19	4.26	2.04	.56	.00	.00	7.04	*	.19	1.48	8.52	3.33	1.85	.56	.00	15.93		
5 TO 9	.00	1.11	2.59	.93	.37	.19	.00	5.19	*	.56	3.52	8.15	2.41	.93	.00	.00	15.56		
10- UP	2.22	7.04	6.67	2.41	.19	.00	.00	18.52	*	11.67	14.07	9.07	1.85	.37	.74	.00	37.41		
TOTAL	2.22	8.33	13.52	5.37	1.11	.19	.00	30.74	*	12.41	19.07	25.74	7.59	3.15	.93	.00	68.89		

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TABLE 4.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF APRIL									
HOUR 15		NUMBER OBS. 540									
		RUNWAY 33									
		*** CROSSWIND LIMITS ***									
TAILWIND LIMITS		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
1 TO 4		.19 .93 3.52 2.59 .56									
5 TO 9		.00 1.48 3.15 1.30 .93									
10- UP		1.67 6.67 5.37 2.59 .37									
TOTAL		1.85 9.07 12.04 6.48 1.85									
		TOTAL * 1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
		7.96 * .00 1.48 7.41 2.41 1.30									
		7.04 * .37 4.44 6.85 3.15 .19									
		16.67 * 9.44 16.85 10.37 1.85 .56									
		31.67 * 9.81 22.78 24.63 7.41 2.04									
		ZERO CROSS									
		.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00									
		TOTAL									
		.00 12.96 .37 15.93 .00 39.07 .37 67.96									

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF APRIL									
HOUR 16		NUMBER OBS. 540									
		RUNWAY 33									
		*** CROSSWIND LIMITS ***									
TAILWIND LIMITS		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
1 TO 4		.00 1.30 2.96 2.59 .37									
5 TO 9		.19 2.96 2.22 1.67 .19									
10- UP		2.41 5.56 5.74 1.48 .74									
TOTAL		2.59 9.81 10.93 5.74 1.30									
		TOTAL * 1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
		7.22 * .00 2.22 6.48 3.52 1.30									
		7.22 * .93 7.04 7.59 2.41 .56									
		16.11 * 10.56 14.07 9.63 1.85 .19									
		30.56 * 11.48 23.33 23.70 7.78 2.04									
		ZERO CROSS									
		.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00									
		TOTAL									
		.00 13.70 .19 18.70 .00 36.67 .19 69.07									

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF APRIL									
HOUR 17		NUMBER OBS. 540									
		RUNWAY 33									
		*** CROSSWIND LIMITS ***									
TAILWIND LIMITS		1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
1 TO 4		.37 2.96 2.59 2.59 .37									
5 TO 9		.56 2.22 1.85 1.30 .74									
10- UP		4.04 5.93 4.17 1.30 .19									
TOTAL		2.96 11.11 8.52 5.19 1.30									
		TOTAL * 1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
		9.26 * .56 3.52 5.37 2.78 .56									
		6.67 * 1.67 10.19 6.85 1.85 .56									
		13.70 * 12.96 14.07 6.48 1.48 .19									
		29.63 * 15.19 27.78 16.70 6.11 1.30									
		ZERO CROSS									
		.00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00									
		TOTAL									
		.00 12.78 .00 21.11 .00 36.11 .56 70.00									

TABLE 4.3. (Continued)

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF APRIL			NUMBER OBS.			540			RUNWAY 33		
HOUR 18			TOTAL			1 TO 5			5 TO 9			15 TO 19		
TAILWIND LIMITS			*** CROSSWIND LIMITS ***			PERCENTAGES			25- UP			20 TO 24		
1 TO 4			1 TO 4			1 TO 4			1 TO 4			1 TO 4		
5 TO 9			5 TO 9			5 TO 9			5 TO 9			5 TO 9		
10- UP			10- UP			10- UP			10- UP			10- UP		
TOTAL			TOTAL			TOTAL			TOTAL			TOTAL		
1 TO 4	5.3	4.4	3.15	1.48	.56	.00	.00	.00	3.15	1.48	.56	2.41	2.04	.56
5 TO 9	.74	3.33	2.22	.56	.37	.00	.00	.00	3.15	12.22	4.94	1.48	.00	.19
10- UP	1.67	6.11	4.07	.56	.56	.00	.00	.00	14.44	13.15	2.96	1.11	.37	.19
TOTAL	3.33	13.89	9.44	2.59	1.48	.00	.00	.00	30.74	32.22	9.81	4.63	.93	.56
ZERO CROSS			ZERO CROSS			ZERO CROSS			ZERO CROSS			ZERO CROSS		
TOTAL			TOTAL			TOTAL			TOTAL			TOTAL		
.00			.00			.00			.00			.00		
.74			.74			.74			.74			.74		
.19			.19			.19			.19			.19		
.93			.93			.93			.93			.93		
68.52			68.52			68.52			68.52			68.52		

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF APRIL			NUMBER OBS.			539			RUNWAY 33		
HOUR 19			TOTAL			1 TO 5			5 TO 9			15 TO 19		
TAILWIND LIMITS			*** CROSSWIND LIMITS ***			PERCENTAGES			25- UP			20 TO 24		
1 TO 4			1 TO 4			1 TO 4			1 TO 4			1 TO 4		
5 TO 9			5 TO 9			5 TO 9			5 TO 9			5 TO 9		
10- UP			10- UP			10- UP			10- UP			10- UP		
TOTAL			TOTAL			TOTAL			TOTAL			TOTAL		
1 TO 4	2.04	5.57	1.86	1.30	.37	.00	.19	.19	7.79	6.31	2.41	1.67	.56	.00
5 TO 9	1.30	3.90	1.48	.19	.19	.00	.56	.56	7.98	11.13	4.95	.93	.19	.19
10- UP	2.23	5.53	2.41	.56	.00	.19	.00	.00	13.54	5.57	2.41	.93	.00	.00
TOTAL	5.57	12.99	5.75	2.04	.56	.19	.74	.74	29.31	23.01	9.28	3.53	.74	.19
ZERO CROSS			ZERO CROSS			ZERO CROSS			ZERO CROSS			ZERO CROSS		
.56			.56			.56			.56			.56		
19.29			19.29			19.29			19.29			19.29		
28.94			28.94			28.94			28.94			28.94		
23.19			23.19			23.19			23.19			23.19		
71.63			71.63			71.63			71.63			71.63		

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF APRIL			NUMBER OBS.			539			RUNWAY 33		
HOUR 20			TOTAL			1 TO 5			5 TO 9			15 TO 19		
TAILWIND LIMITS			*** CROSSWIND LIMITS ***			PERCENTAGES			25- UP			20 TO 24		
1 TO 4			1 TO 4			1 TO 4			1 TO 4			1 TO 4		
5 TO 9			5 TO 9			5 TO 9			5 TO 9			5 TO 9		
10- UP			10- UP			10- UP			10- UP			10- UP		
TOTAL			TOTAL			TOTAL			TOTAL			TOTAL		
1 TO 4	4.08	4.64	1.11	1.11	.19	.00	.56	.56	11.69	10.76	5.19	2.97	.37	.00
5 TO 9	2.04	4.45	1.48	.19	.00	.00	.56	.56	8.72	7.24	4.95	1.30	.19	.00
10- UP	2.04	2.41	2.23	.19	.19	.00	.00	.00	7.05	12.80	6.49	1.48	.37	.00
TOTAL	8.16	11.50	4.62	1.48	.37	.00	1.11	1.11	27.46	32.28	18.92	4.82	.93	.00
ZERO CROSS			ZERO CROSS			ZERO CROSS			ZERO CROSS			ZERO CROSS		
.74			.74			.74			.74			.74		
22.08			22.08			22.08			22.08			22.08		
25.79			25.79			25.79			25.79			25.79		
23.75			23.75			23.75			23.75			23.75		
71.61			71.61			71.61			71.61			71.61		

TABLE 4.3. (Concluded)

TAILWINDS VS CROSSWINDS													
KSC PEAK WINDS		MONTH OF APRIL		NUMBER OBS.		539							
HOUR 21		HOUR 22		HOUR 23									
TAILWIND LIMITS		TAILWIND LIMITS		TAILWIND LIMITS									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									
PERCENTAGES		PERCENTAGES		PERCENTAGES									
1 TO 4		1 TO 4		1 TO 4									
5 TO 9		5 TO 9		5 TO 9									
10- UP		10- UP		10- UP									
TOTAL		TOTAL		TOTAL									
ZERO CROSS		ZERO CROSS		ZERO CROSS									
25- UP		25- UP		25- UP									

**TABLE 4.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END**

MSC PEAK WINDS				HEAD/TAIL WIND REVERSALS				MONTH OF APRIL			
*** RUNWAY 15 ***				*** RUNWAY 33 ***							
GIVEN A				GIVEN A							
HEAD WIND TAIL WIND				HEAD WIND TAIL WIND							
PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE
REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS
TOTAL	HEAD-TAIL	TAIL-HEAD	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL
> 0	- 3	> 0	- 3	> 0	- 3	> 0	- 3	> 0	- 3	> 0	- 3
00-02	7.01	4.46	3.35	6.79	9.75	8.24	3.35	4.89	9.52	7.55	
03-05	7.87	5.02	2.85	8.13	7.44	8.12	3.16	4.96	7.89	8.26	
06-08	9.07	4.34	5.33	7.45	12.74	10.04	5.64	4.40	13.25	7.66	
09-11	9.98	4.34	5.64	7.14	14.38	9.98	5.64	4.34	14.29	7.16	
12-14	10.29	4.40	5.89	6.65	17.37	10.22	5.82	4.40	17.06	6.68	
15-17	7.43	3.78	4.15	5.46	13.51	7.93	4.09	3.84	13.15	5.58	
18-20	1.13	3.04	4.09	4.26	14.25	7.06	3.97	3.10	13.45	4.39	
21-23	7.19	4.52	2.66	6.33	9.33	7.25	2.79	4.46	9.38	6.35	
00-23	8.48	4.24	4.24	6.46	14.32	8.60	4.31	4.30	12.23	6.63	

4.44

MSC PEAK WINDS				HEADWIND TO TAILWIND REVERSALS				MONTH OF APRIL			
*** RUNWAY 15 ***				*** RUNWAY 33 ***							
GIVEN A				GIVEN A							
HEADWIND TAILWIND				HEADWIND TAILWIND							
PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE	PERCENTAGE
REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS	REVERSALS
TOTAL	HEAD-TAIL	TAIL-HEAD	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL	TO TAIL
> 0	- 3	> 0	- 3	> 0	- 3	> 0	- 3	> 0	- 3	> 0	- 3
00-02	5.57	1.04	0.19	6.79	0.88	6.47	0.88	9.52	0.18	7.89	
03-05	7.33	0.50	0.30	8.13	0.31	6.35	1.24	7.89	0.31	7.89	
06-08	4.79	1.81	0.85	7.45	0.73	8.59	3.93	13.25	0.73	13.25	
09-11	4.69	1.73	0.71	7.14	0.32	9.98	3.92	14.29	2.04	14.29	
12-14	3.56	1.87	1.22	6.65	0.36	9.98	4.36	17.06	2.72	17.06	
15-17	3.22	1.25	0.98	5.46	0.57	10.50	3.59	13.15	1.00	13.15	
18-20	2.78	0.78	0.70	4.26	0.63	6.67	2.31	13.45	0.63	13.45	
21-23	4.08	1.82	0.43	6.33	0.21	8.38	2.50	9.38	0.21	9.38	
00-23	4.44	1.35	0.67	6.46	0.99	8.38	2.86	12.23	0.99	12.23	

4.48

TABLE 4.5 KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY CLASS (NOTES)	HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF APRIL											
	MAY				JUN				JUL			
	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF
U-1	6.70	2.33	1.49	2.05	3.03	9.00	4.24	2.72	4.18	13.35	13.25	5.25
1-2	14.88	8.81	9.97	7.74	10.21	17.56	11.77	13.25	13.35	13.35	13.25	14.12
2-3	22.85	11.25	13.14	9.86	14.01	25.54	14.44	17.24	16.53	16.53	17.24	18.75
3-4	34.18	16.41	16.68	15.66	19.42	32.08	18.21	21.78	21.91	21.91	21.78	23.83
4-5	39.11	21.38	20.69	19.48	24.73	40.64	23.23	25.77	27.49	27.49	25.77	29.76
5-6	45.91	26.44	24.79	25.00	30.06	47.46	28.26	31.03	33.67	33.67	31.03	35.60
6-7	51.43	30.80	27.77	28.65	34.13	52.25	33.12	33.58	37.65	37.65	33.58	39.72
7-8	56.75	33.54	30.18	33.10	37.89	58.35	37.68	37.75	40.24	40.24	37.75	44.22
8-9	63.55	38.40	36.91	39.23	43.98	64.01	43.33	42.47	44.42	44.42	42.47	49.35
9-10	71.09	46.10	43.43	46.26	51.15	69.61	50.55	45.37	50.00	50.00	45.37	54.81
10-11	76.94	50.76	47.44	51.42	56.05	73.29	53.53	47.91	51.99	51.99	47.91	57.63
11-12	81.30	55.22	51.72	55.69	60.39	75.76	59.03	51.72	57.17	57.17	51.72	61.79
12-13	85.76	60.79	57.78	61.57	65.92	79.54	64.05	56.08	61.75	61.75	56.08	66.20
13-14	89.48	68.09	64.59	66.46	71.61	83.74	68.76	62.25	65.94	65.94	62.25	71.00
14-15	93.71	73.05	68.87	71.17	75.71	86.07	73.16	66.42	69.92	69.92	66.42	74.65
15-16	93.62	78.12	73.81	75.80	79.90	88.39	75.51	69.15	73.90	73.90	69.15	77.43
16-17	96.17	83.49	79.78	79.00	84.19	90.13	78.96	75.32	78.88	78.88	75.32	81.34
17-18	97.66	87.03	83.04	82.92	87.30	91.29	81.48	78.22	80.88	80.88	78.22	83.44
18-19	98.41	89.87	86.86	86.83	90.21	92.45	85.56	82.76	85.66	85.66	82.76	86.93
19-20	99.26	95.24	91.43	91.55	94.16	94.63	89.17	87.11	90.24	90.24	87.11	90.50
20-21	99.47	96.76	93.01	93.24	95.44	95.50	90.89	89.47	91.43	91.43	89.47	92.01
21-22	99.89	97.87	95.06	94.93	96.80	96.95	92.94	92.38	94.22	94.22	92.38	94.24
22-23	99.89	98.07	96.46	96.26	97.58	97.53	94.51	94.37	95.42	95.42	94.37	95.54
23-24	99.69	99.09	97.58	97.86	98.55	98.69	96.39	96.37	96.81	96.81	96.37	97.14
24-25	99.84	99.39	96.32	98.67	99.03	98.84	97.17	97.46	97.21	97.21	97.46	97.73
25-26	100.00	99.59	98.97	99.02	99.37	99.56	98.27	98.37	98.61	98.61	98.37	98.74
26-27	99.89	99.60	99.16	99.30	99.56	99.71	98.74	98.73	99.00	99.00	98.73	99.08
27-28	99.89	99.80	99.15	99.56	99.66	100.00	99.06	99.09	99.20	99.20	99.09	99.66
28-29	99.89	99.80	99.44	99.82	99.76	99.89	99.53	99.27	99.80	99.80	99.27	99.66
29-30	99.89	99.80	99.63	99.91	99.83	99.89	99.69	99.46	99.80	99.80	99.46	99.75
30-31	99.89	99.80	99.72	100.00	99.88	99.89	99.69	100.00	99.80	99.80	99.69	99.87
31-32	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
32-33	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
33-34	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
34-35	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
35-36	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
36-37	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
37-38	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
38-39	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
39-40	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
40-41	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
41-42	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
42-43	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
43-44	99.89	99.90	99.91	99.91	99.95	99.89	99.89	99.89	99.80	99.80	99.89	99.96
NBS	941	987	1073	1124	4125	689	637	551	502	502	551	2379

TABLE 5.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY	MSC PEAK WINDS															TOTAL NUMBER OBS.			
	CROSSWINDS																		
	MONTH OF MAY																		
	CROSSWIND																		
HRS	CRITICAL LIMITS IN KNOTS															ZERO CROSSWIND			
	1	10	4	5	10	9	10	10	14	15	10	19	2	10	24			25	ABOVE
	PERCENTAGES																		
00-02	44.00	32.44	10.51	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	10.99	1674
03-05	46.27	30.11	7.17	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	11.11	1674
06-08	34.47	36.50	15.29	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54	0.30	1674
09-11	20.19	36.74	29.27	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	10.22	1.67	1674
12-14	12.07	28.67	41.40	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.22	.48	1674
15-17	12.19	33.93	36.47	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	.78	1674
18-20	30.17	41.70	17.62	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	8.30	1674
21-23	38.59	32.44	13.74	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	10.39	1674
00-23	29.74	34.07	21.68	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	6.00	13392

TABLE 5.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

MRS	KSC PEAK WINDS										TAILWINDS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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	RUNWAY 15										RUNWAY 33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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00-02	17.80	6.51	2.69	3.17	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	

TABLE 5.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

ASC PEAK WINDS										TAILWINDS VS CROSSWINDS										
MONTH OF MAY										MONTH OF MAY										
HOUR 3										NUMBER OBS. 558										
RUNWAY 15										RUNWAY 33										
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***										
PERCENTAGES										PERCENTAGES										
TAILWIND LIMITS	1	10	5	10	5	10	15	20	25	30	1	10	5	10	5	10	15	20	25	30
1 TO 4	6.59	6.81	1.79	.72	.60	.00	1.25	17.56	9.86	7.35	2.15	1.00	.00	.00	.00	1.43	21.86			
5 TO 9	1.79	1.43	1.25	.18	.00	.00	.72	5.36	12.37	11.29	3.76	1.25	.36	.18	.00	4.84	34.05			
10- UP	1.45	.72	.18	.18	.00	.00	.00	2.33	8.42	5.20	3.23	.72	.36	.00	.00	.00	17.92			
TOTAL	13.84	8.96	3.23	1.08	.60	.00	1.97	25.27	30.65	23.84	9.14	3.05	.72	.18	.00	6.27	73.84			
HOUR 1										HOUR 2										
RUNWAY 15										RUNWAY 33										
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***										
PERCENTAGES										PERCENTAGES										
TAILWIND LIMITS	1	10	5	10	5	10	15	20	25	30	1	10	5	10	5	10	15	20	25	30
1 TO 4	5.63	8.24	1.43	.18	.00	.00	1.25	17.74	13.44	5.91	.90	.00	.00	.00	.00	2.51	23.66			
5 TO 9	2.09	1.79	.18	.18	.00	.00	.72	5.56	11.47	10.57	4.66	.54	.36	.00	.00	4.30	31.90			
10- UP	1.43	.90	.72	.00	.00	.00	.00	3.05	6.63	4.48	2.51	1.25	.18	.18	.00	.54	15.77			
TOTAL	13.75	10.93	2.33	.36	.00	.00	1.97	26.34	31.54	20.97	8.06	2.69	.54	.18	.00	7.35	71.33			
HOUR 2										HOUR 3										
RUNWAY 15										RUNWAY 33										
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***										
PERCENTAGES										PERCENTAGES										
TAILWIND LIMITS	1	10	5	10	5	10	15	20	25	30	1	10	5	10	5	10	15	20	25	30
1 TO 4	8.06	6.99	.72	.18	.00	.00	2.15	18.10	16.13	8.78	1.61	.72	.00	.00	.00	1.61	28.65			
5 TO 9	2.87	2.87	1.43	.18	.00	.00	1.25	8.60	10.04	8.96	3.58	.18	.00	.00	.00	5.20	28.14			
10- UP	1.43	.90	.18	.18	.00	.00	.00	2.69	4.48	4.12	1.25	1.61	.18	.00	.00	.54	12.19			
TOTAL	12.37	10.75	2.33	.54	.00	.00	3.41	29.39	30.65	21.86	6.45	2.51	.18	.00	.00	7.35	69.18			

TABLE 5.3. (Continued)

KSC PEAK WINDS											
TAILWINDS VS CROSSWINDS											
MONTH OF MAY											
HOUR 3											
NUMBER OBS. 558											
RUNWAY 15											
*** CROSSWIND LIMITS ***											
PERCENTAGES											
TAILWIND LIMITS											
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP											
1 TO 4	7.03	4.78	.72	.36	.00	.00	2.15	19.53	18.46	7.35	1.97
5 TO 9	3.23	2.87	.36	.00	.00	.00	1.43	7.89	9.68	2.33	.72
10- UP	1.25	1.25	.54	.18	.00	.00	.00	3.23	4.12	3.23	1.61
TOTAL	12.01	8.90	1.61	.54	.00	.00	3.58	30.65	32.26	20.47	5.01
*** CROSSWIND LIMITS ***											
PERCENTAGES											
TAILWIND LIMITS											
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP											
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ZERO CROSS											
1.97 30.65											
.00 27.24											
.00 9.50											
6.63 67.38											
HOUR 4											
NUMBER OBS. 558											
RUNWAY 33											
*** CROSSWIND LIMITS ***											
PERCENTAGES											
TAILWIND LIMITS											
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP											
1 TO 4	10.39	8.60	.18	.18	.00	.00	1.97	21.33	21.33	9.14	1.25
5 TO 9	4.04	1.61	.36	.16	.00	.00	1.08	8.06	6.42	2.69	.72
10- UP	1.61	1.08	.36	.00	.00	.00	.00	3.05	3.58	2.51	1.43
TOTAL	16.05	11.29	.90	.36	.00	.00	3.05	32.44	33.33	18.10	5.38
*** CROSSWIND LIMITS ***											
PERCENTAGES											
TAILWIND LIMITS											
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP											
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ZERO CROSS											
1.61 34.77											
3.58 22.04											
.18 8.60											
5.38 65.41											
HOUR 5											
NUMBER OBS. 558											
RUNWAY 15											
*** CROSSWIND LIMITS ***											
PERCENTAGES											
TAILWIND LIMITS											
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP											
1 TO 4	13.08	5.56	1.08	.18	.00	.00	2.33	22.22	19.53	8.60	1.79
5 TO 9	4.84	2.87	.90	.18	.00	.00	1.25	10.04	8.06	6.09	1.08
10- UP	1.61	1.25	.36	.00	.00	.00	.00	3.23	3.23	3.23	.90
TOTAL	19.53	9.68	2.33	.36	.00	.00	3.58	35.48	30.82	17.92	5.38
*** CROSSWIND LIMITS ***											
PERCENTAGES											
TAILWIND LIMITS											
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP											
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ZERO CROSS											
1.79 33.33											
2.33 20.25											
.18 8.60											
4.30 61.83											

78

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
HOUR 6					MONTH OF MAY					NUMBER OBS. 558																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
TAILWIND LIMITS	RUNWAY 15				ZERO CROSS	TOTAL	*** CROSSWIND LIMITS ***				RUNWAY 33				ZERO CROSS	TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	*** CROSSWIND LIMITS ***						*** CROSSWIND LIMITS ***																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1	10	4	5			10	1014	15	1019	20	1024	25	1029			25	1034	25	1039	25	1044	25	1049	25	1054	25	1059	25	1064	25	1069	25	1074	25	1079	25	1084	25	1089	25	1094	25	1099	25	1104	25	1109	25	1114	25	1119	25	1124	25	1129	25	1134	25	1139	25	1144	25	1149	25	1154	25	1159	25	1164	25	1169	25	1174	25	1179	25	1184	25	1189	25	1194	25	1199	25	1204	25	1209	25	1214	25	1219	25	1224	25	1229	25	1234	25	1239	25	1244	25	1249	25	1254	25	1259	25	1264	25	1269	25	1274	25	1279	25	1284	25	1289	25	1294	25	1299	25	1304	25	1309	25	1314	25	1319	25	1324	25	1329	25	1334	25	1339	25	1344	25	1349	25	1354	25	1359	25	1364	25	1369	25	1374	25	1379	25	1384	25	1389	25	1394	25	1399	25	1404	25	1409	25	1414	25	1419	25	1424	25	1429	25	1434	25	1439	25	1444	25	1449	25	1454	25	1459	25	1464	25	1469	25	1474	25	1479	25	1484	25	1489	25	1494	25	1499	25	1504	25	1509	25	1514	25	1519	25	1524	25	1529	25	1534	25	1539	25	1544	25	1549	25	1554	25	1559	25	1564	25	1569	25	1574	25	1579	25	1584	25	1589	25	1594	25	1599	25	1604	25	1609	25	1614	25	1619	25	1624	25	1629	25	1634	25	1639	25	1644	25	1649	25	1654	25	1659	25	1664	25	1669	25	1674	25	1679	25	1684	25	1689	25	1694	25	1699	25	1704	25	1709	25	1714	25	1719	25	1724	25	1729	25	1734	25	1739	25	1744	25	1749	25	1754	25	1759	25	1764	25	1769	25	1774	25	1779	25	1784	25	1789	25	1794	25	1799	25	1804	25	1809	25	1814	25	1819	25	1824	25	1829	25	1834	25	1839	25	1844	25	1849	25	1854	25	1859	25	1864	25	1869	25	1874	25	1879	25	1884	25	1889	25	1894	25	1899	25	1904	25	1909	25	1914	25	1919	25	1924	25	1929	25	1934	25	1939	25	1944	25	1949	25	1954	25	1959	25	1964	25	1969	25	1974	25	1979	25	1984	25	1989	25	1994	25	1999	25	2004	25	2009	25	2014	25	2019	25	2024	25	2029	25	2034	25	2039	25	2044	25	2049	25	2054	25	2059	25	2064	25	2069	25	2074	25	2079	25	2084	25	2089	25	2094	25	2099	25	2104	25	2109	25	2114	25	2119	25	2124	25	2129	25	2134	25	2139	25	2144	25	2149	25	2154	25	2159	25	2164	25	2169	25	2174	25	2179	25	2184	25	2189	25	2194	25	2199	25

TABLE 5.3. (Continued)

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TABLE 5.3. (Continued)

KSC PEAK WINDS			TAILWINDS VS CROSSWINDS																					
			MONTH OF MAY																					
HOUR 12			NUMBER OBS. 558																					
					RUNWAY 15				RUNWAY 33															
					*** CROSSWIND LIMITS ***				*** CROSSWIND LIMITS ***															
TAILWIND LIMITS			1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25-UP		ZERO CROSS		TOTAL							
					PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES													
1 TO 4	.18	1.43	4.49	2.15	.36	8.60	.00	.00	2.87	6.63	.04	.10	.18	.00	14.70									
5 TO 9	.04	3.58	4.30	.18	.36	9.32	.00	.36	4.66	9.32	2.69	.36	.18	.00	17.56									
10-UP	2.15	7.35	3.76	1.08	.54	14.87	.00	.00	12.22	12.19	9.50	2.33	.00	.00	34.77									
TOTAL	2.07	12.37	12.54	3.41	1.25	32.80	.00	.00	19.71	25.45	9.86	1.08	.36	.00	67.03									
KSC PEAK WINDS			MONTH OF MAY												TAILWINDS VS CROSSWINDS									
HOUR 13			NUMBER OBS. 558																					
					RUNWAY 15				RUNWAY 33															
					*** CROSSWIND LIMITS ***				*** CROSSWIND LIMITS ***															
TAILWIND LIMITS			1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25-UP		ZERO CROSS		TOTAL							
					PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES													
1 TO 4	.18	1.08	4.48	1.79	.36	7.89	.00	.00	2.15	9.32	4.30	.72	.18	.00	16.85									
5 TO 9	.18	1.97	4.12	1.08	.18	7.71	.00	.00	5.02	11.11	2.69	.54	.00	.18	19.89									
10-UP	2.69	4.48	5.56	.36	.54	13.98	.00	.00	11.83	7.89	3.23	.36	.00	.36	33.33									
TOTAL	3.05	7.53	14.16	3.23	1.08	29.57	.00	.00	19.00	26.32	10.22	1.64	.18	.54	70.07									
KSC PEAK WINDS			MONTH OF MAY												TAILWINDS VS CROSSWINDS									
HOUR 14			NUMBER OBS. 558																					
					RUNWAY 15				RUNWAY 33															
					*** CROSSWIND LIMITS ***				*** CROSSWIND LIMITS ***															
TAILWIND LIMITS			1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25-UP		ZERO CROSS		TOTAL							
					PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES													
1 TO 4	.00	.72	6.45	2.33	.00	9.50	.00	.00	1.43	6.81	6.27	.00	.18	.00	14.70									
5 TO 9	.18	2.51	2.33	1.08	.54	6.81	.00	.00	5.20	11.65	2.69	.54	.18	.00	20.61									
10-UP	1.61	4.66	5.91	.72	.72	13.62	.00	.00	12.90	10.57	2.87	.18	.54	.00	34.41									
TOTAL	1.79	7.89	14.70	4.12	1.25	29.93	.00	.00	19.53	29.03	11.83	.72	.90	.00	69.71									

TABLE 5.3. (Continued)

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TABLE 5.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS															
		MONTH OF MAY															
HOUR 18		NUMBER OBS. 558															
TAILWIND LIMITS	1 TO 4 5 TO 9 10- UP TOTAL	RUNWAY 15				TOTAL *	RUNWAY 33				TOTAL						
		*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***										
		PERCENTAGES					PERCENTAGES										
		1 TO 4	5 TO 9	10 TO 14	15 TO 19		1 TO 4	5 TO 9	10 TO 14	15 TO 19							
1 TO 4		1.08	3.05	3.58	.90	.18	.00	.00	8.78 *	2.33	6.09	5.56	2.33	.36	.00	15.67	
5 TO 9		.54	4.12	2.15	.36	.00	.00	.00	7.17 *	2.15	13.62	5.73	1.25	.36	.00	24.01	
10- UP		2.33	3.94	2.51	.36	.00	.00	.18	9.32 *	11.65	15.59	5.20	1.08	.00	.18	33.07	
TOTAL		3.94	11.11	8.24	1.61	.18	.00	.18	25.27 *	16.13	35.30	16.49	4.66	.72	.18	74.55	
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS															
		MONTH OF MAY															
HOUR 19		NUMBER OBS. 558															
TAILWIND LIMITS		1 TO 4 5 TO 9 10- UP TOTAL	RUNWAY 15				TOTAL *	RUNWAY 33				TOTAL					
			*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***									
			PERCENTAGES					PERCENTAGES									
			1 TO 4	5 TO 9	10 TO 14	15 TO 19		1 TO 4	5 TO 9	10 TO 14	15 TO 19						
1 TO 4			1.47	4.30	1.43	1.25	.00	.00	.36	9.32 *	5.73	6.27	3.76	2.15	.00	.00	18.64
5 TO 9			1.61	5.56	1.08	.00	.00	.00	.18	8.42 *	6.99	13.98	5.02	1.61	.18	.00	30.11
10- UP			1.79	3.41	.72	.18	.00	.00	.18	6.27 *	12.01	9.68	3.58	.36	.36	.00	26.88
TOTAL			5.38	13.26	3.23	1.43	.00	.00	.72	24.01 *	24.73	29.93	12.37	4.12	.54	.00	75.63
KSC PEAK WINDS			TAILWINDS VS CROSSWINDS														
			MONTH OF MAY														
HOUR 20			NUMBER OBS. 558														
TAILWIND LIMITS	1 TO 4 5 TO 9 10- UP TOTAL		RUNWAY 15				TOTAL *	RUNWAY 33				TOTAL					
			*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***									
			PERCENTAGES					PERCENTAGES									
			1 TO 4	5 TO 9	10 TO 14	15 TO 19		1 TO 4	5 TO 9	10 TO 14	15 TO 19						
1 TO 4			3.41	3.58	1.79	.36	.00	.00	.54	9.68 *	10.57	6.63	4.15	1.25	.18	.00	21.15
5 TO 9			2.33	3.23	1.43	.00	.00	.00	.90	7.89 *	8.06	13.26	3.41	1.79	.36	.00	30.11
10- UP			2.15	1.25	1.08	.00	.00	.00	.00	4.48 *	13.80	7.53	4.69	.72	.54	.00	26.34
TOTAL			7.69	8.06	4.30	.36	.00	.00	1.43	22.04 *	32.44	27.42	8.24	3.76	1.08	.00	77.60

TABLE 5.3. (Concluded)

MSC PEAK WINDS		TAILWINDS VS CROSSWINDS																		
		MONTH OF MAY																		
HOUR 21		NUMBER OBS. 558																		
TAILWIND LIMITS	1 TO 4	RUNWAY 15					ZERO CROSS	TOTAL *	RUNWAY 33										ZERO CROSS	TOTAL
		*** CROSSWIND LIMITS ***							*** CROSSWIND LIMITS ***											
		PERCENTAGES							PERCENTAGES											
		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24			25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP					
1 TO 4	3.16	3.76	2.51	.72	.00	1.08	11.83	8.78	5.20	2.51	.90	.36	.00	.90	18.64					
5 TO 9	2.45	2.51	.90	.00	.00	.18	5.73	11.63	11.11	5.02	1.79	.18	.00	.48	34.59					
10- UP	1.25	1.97	.90	.18	.00	.00	4.30	13.62	6.27	2.69	.72	.18	.00	.72	24.19					
TOTAL	7.17	8.24	4.30	.90	.00	1.25	21.86	34.23	22.58	10.22	3.41	.72	.18	6.09	77.42					
HOUR 22		NUMBER OBS. 558																		
HOUR 23		NUMBER OBS. 558																		

TABLE 5.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END

HRS	KSC PEAK WINDS									
	HEAD/TAIL WIND REVERSALS					MONTH OF MAY				
	*** RUNWAY 15 ***					*** RUNWAY 33 ***				
	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS
00-02	9.34	5.57	3.77	7.63	13.94	9.34	3.59	5.75	12.55	8.05
03-05	7.61	6.10	3.71	9.10	11.27	10.35	3.83	6.52	10.88	10.06
06-08	1.03	6.04	5.98	9.68	15.92	12.27	6.52	5.75	16.64	9.45
09-11	11.79	5.03	6.76	7.92	16.52	12.09	6.94	5.15	18.92	8.13
12-14	11.49	5.03	6.46	7.26	21.01	11.73	6.58	5.15	21.19	7.47
15-17	8.66	3.89	4.97	5.41	17.66	8.86	4.97	3.89	17.55	5.43
18-20	8.08	3.47	4.61	4.56	19.35	8.02	4.49	3.53	18.61	4.65
21-23	9.04	5.09	3.95	6.54	17.79	9.10	3.95	5.15	17.05	6.70
00-23	10.05	5.03	5.03	7.17	16.63	10.22	5.11	5.11	16.59	7.36

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KSC PEAK WINDS

HRS	KSC PEAK WINDS									
	HEAD/TAIL WIND REVERSALS					MONTH OF MAY				
	*** RUNWAY 15 ***					*** RUNWAY 33 ***				
	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS
00-02	5.66	1.56	1.96	.41	7.63	9.21	3.35	3.35	.00	12.55
03-05	6.96	1.96	2.88	.18	9.10	8.50	2.38	2.38	.00	10.88
06-08	6.33	2.88	2.88	.48	9.68	11.30	4.58	4.58	.76	16.64
09-11	3.96	2.64	2.07	1.32	7.92	9.62	6.36	6.36	2.94	18.92
12-14	3.80	2.07	1.38	1.38	7.26	10.21	7.90	7.90	3.08	21.19
15-17	3.50	.75	1.17	1.17	5.41	11.21	3.81	3.81	2.54	17.55
18-20	2.44	1.26	.86	.86	4.56	12.16	3.72	3.72	2.73	18.61
21-23	5.00	1.23	.31	.31	6.54	11.63	4.65	4.65	.78	17.05
00-23	4.66	1.75	.76	.76	7.17	10.37	4.64	4.64	1.58	16.59

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TABLE 5.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY COMPONENT CLASS (KNOTS)	KSC PEAK WINDS				HEADWIND CUMULATIVE PERCENTAGE FREQUENCY				MONTH OF MAY			
	*** RUNWAY 15 ***				*** RUNWAY 33 ***							
	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
0- 1	8.25	1.90	1.41	3.56	3.56	3.27	3.58	3.96	5.36	3.27	3.58	6.96
1- 2	14.96	9.66	7.90	10.30	10.30	15.96	16.42	16.35	12.83	15.96	16.42	16.35
2- 3	22.72	11.82	10.23	13.93	13.93	17.88	20.63	21.77	18.18	17.88	20.63	21.77
3- 4	30.78	16.12	15.56	19.75	19.75	25.19	27.79	29.79	24.19	25.19	27.79	29.79
4- 5	41.32	21.96	18.55	25.76	25.76	28.85	32.63	36.71	30.84	28.85	32.63	36.71
5- 6	49.76	29.12	23.71	32.65	32.65	35.58	39.37	43.68	38.47	35.58	39.37	43.68
6- 7	56.28	32.52	28.87	37.65	37.65	39.42	44.32	48.70	44.32	39.42	44.32	48.70
7- 8	62.03	36.95	33.36	42.17	42.17	43.08	47.79	53.81	50.00	43.08	47.79	53.81
8- 9	68.46	43.45	39.35	48.11	48.11	47.69	52.21	58.79	53.73	47.69	52.21	58.79
9-10	76.80	50.65	46.42	56.82	56.82	54.42	60.00	66.02	62.18	54.42	60.00	66.02
10-11	81.69	55.39	55.32	62.37	62.37	56.92	64.21	69.46	66.40	56.92	64.21	69.46
11-12	85.04	61.26	60.82	67.82	67.82	62.12	67.16	73.82	72.40	62.12	67.16	73.82
12-13	87.92	73.04	67.47	73.93	73.93	69.42	71.58	79.20	83.03	69.42	71.58	79.20
13-14	91.37	74.36	73.13	79.55	79.55	75.38	75.16	82.99	84.42	75.38	75.16	82.99
14-15	93.48	83.32	77.70	83.47	83.47	79.42	78.78	85.32	86.20	79.42	78.78	85.32
15-16	94.25	88.50	81.36	86.97	86.97	83.65	82.32	87.97	88.47	83.65	82.32	87.97
16-17	96.07	91.33	85.27	90.06	90.06	86.54	84.84	90.26	91.07	86.54	84.84	90.26
17-18	96.64	92.74	87.94	91.80	91.80	88.65	86.53	91.80	92.86	88.65	86.53	91.80
18-19	97.41	95.00	93.68	93.68	93.68	90.19	89.47	93.65	95.13	90.19	89.47	93.65
19-20	98.47	96.98	95.43	96.01	96.01	93.27	94.11	95.86	96.10	93.27	94.11	95.86
20-21	98.75	98.02	95.09	97.00	97.00	93.85	95.37	96.52	96.92	93.85	95.37	96.52
21-22	99.14	98.59	96.34	97.89	97.89	95.38	96.21	97.44	98.38	95.38	96.21	97.44
22-23	99.23	99.15	97.67	98.54	98.54	96.54	97.68	98.28	99.03	96.54	97.68	98.28
23-24	99.62	99.72	98.59	99.22	99.22	97.31	98.53	98.55	99.19	97.31	98.53	98.55
24-25	99.81	99.91	98.84	99.42	99.42	97.88	98.90	98.90	99.35	97.88	98.90	98.90
25-26	99.81	99.40	98.92	99.48	99.48	98.46	98.95	98.95	99.51	98.46	98.95	98.95
26-27	99.81	99.57	99.17	99.60	99.60	98.65	99.21	99.21	99.51	98.65	99.21	99.21
27-28	100.00	99.83	99.42	99.78	99.78	99.04	99.16	99.34	99.51	99.04	99.16	99.34
28-29	100.00	100.00	99.58	99.84	99.84	99.37	99.37	99.37	99.51	99.37	99.37	99.37
29-30	100.00	100.00	99.67	99.87	99.87	99.23	99.52	99.52	99.51	99.23	99.52	99.52
30-31	100.00	100.00	99.75	99.89	99.89	99.23	99.60	99.60	99.51	99.23	99.60	99.60
31-32	100.00	100.00	99.83	99.91	99.91	99.42	99.78	99.78	99.51	99.42	99.78	99.78
32-33	100.00	100.00	99.92	99.98	99.98	99.62	99.87	99.87	99.68	99.62	99.87	99.87
33-34	100.00	100.00	99.92	99.98	99.98	99.62	99.87	99.87	99.68	99.62	99.87	99.87
34-35	100.00	100.00	99.92	99.98	99.98	99.62	99.87	99.87	99.68	99.62	99.87	99.87
35-36	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
N085	1043	1159	1202	4465	4465	520	475	2269	616	520	475	2269

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TABLE 6.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33	KSC PEAK WINDS MONTH OF JUNE									
	CROSSWIND					CROSSWINDS				
	***** CRITICAL LIMITS IN KNOTS *****					*****				
HRS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.		
00-02	47.84	27.63	7.85	2.47	.80	.49	12.92	1618	1618	
03-05	46.27	24.69	7.78	2.84	.62	.37	15.43	1620	1620	
06-08	36.17	33.95	14.38	4.07	1.11	.19	10.12	1620	1620	
09-11	19.33	39.41	27.36	8.09	1.91	.56	3.34	1619	1619	
12-14	13.70	30.68	39.01	11.91	2.96	.86	.86	1620	1620	
15-17	16.54	34.12	34.01	9.32	2.28	1.85	1.67	1620	1620	
18-20	34.01	35.25	15.31	5.62	1.85	.62	7.35	1620	1620	
21-23	46.91	28.52	8.02	3.95	.62	.43	11.54	1620	1620	
00-23	32.65	31.81	14.22	8.04	1.52	.67	7.90	12957	12957	

TABLE 6.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

RUNWAY 15	KSC PEAK WINDS MONTH OF JUNE									
	TAILWIND					TAILWINDS				
	***** CRITICAL LIMITS IN KNOTS *****					*****				
HRS	1 TO 4	5 TO 9	10 ABOVE	PERCENTAGES	TOTAL NUMBER OBS.	1 TO 4	5 TO 9	10 ABOVE	PERCENTAGES	TOTAL NUMBER OBS.
00-02	17.74	3.77	.49		1618	38.01	26.08	12.48		12.48
03-05	24.69	5.37	.49		1620	39.14	18.21	7.53		7.53
06-08	23.95	11.60	2.10		1620	29.63	20.49	9.69		9.69
09-11	16.06	13.34	7.84		1619	18.22	23.35	20.94		20.94
12-14	11.91	8.70	7.72		1620	17.22	22.90	31.17		31.17
15-17	9.32	7.53	6.48		1620	15.93	25.25	35.12		35.12
18-20	11.79	5.80	3.33		1620	21.54	29.07	27.47		27.47
21-23	13.52	3.70	1.54		1620	30.80	32.65	15.86		15.86
00-23	16.12	7.46	5.75		12957	26.31	24.75	20.04		20.04

TABLE 6.3. (Continued)

KSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JUNE														
HOUR 3														
NUMBER OBS. 540														
RUNWAY 15														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP
1 TO 4	12.42	7.04	1.30	.19	.00	.00	1.48	22.22	22.96	8.89	1.67	.74	.00	.00
5 TO 9	2.96	1.11	.56	.19	.00	.00	.37	5.37	6.48	6.30	2.96	1.48	.00	.00
10- UP	.19	.37	.00	.00	.00	.00	.00	.56	2.59	2.59	4.22	.37	.56	.19
TOTAL	15.37	8.52	1.85	.37	.00	.00	1.85	28.15	32.04	17.78	6.85	2.59	.56	.37
RUNWAY 33														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP
1 TO 4	14.26	5.93	1.48	.56	.00	.00	3.33	25.56	22.59	9.44	1.67	1.11	.00	.00
5 TO 9	2.78	.56	.19	.19	.00	.00	1.48	5.19	5.37	6.11	2.59	.19	.19	.00
10- UP	.00	.00	.19	.19	.00	.00	.00	.37	1.48	3.33	1.67	.56	.37	.19
TOTAL	17.04	6.48	1.85	.74	.00	.00	4.81	31.11	29.44	18.89	5.93	1.85	.56	.19
ZERO CROSS														
TOTAL														
3.70 38.52														
3.70 18.15														
.19 7.78														
7.59 67.78														
KSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JUNE														
HOUR 4														
NUMBER OBS. 540														
RUNWAY 33														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP
1 TO 4	14.26	5.93	1.48	.56	.00	.00	3.33	25.56	22.59	9.44	1.67	1.11	.00	.00
5 TO 9	2.78	.56	.19	.19	.00	.00	1.48	5.19	5.37	6.11	2.59	.19	.19	.00
10- UP	.00	.00	.19	.19	.00	.00	.00	.37	1.48	3.33	1.67	.56	.37	.19
TOTAL	17.04	6.48	1.85	.74	.00	.00	4.81	31.11	29.44	18.89	5.93	1.85	.56	.19
ZERO CROSS														
TOTAL														
3.70 38.52														
3.70 18.15														
.19 7.78														
7.59 67.78														
KSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JUNE														
HOUR 5														
NUMBER OBS. 540														
RUNWAY 33														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP
1 TO 4	13.70	6.48	1.30	.19	.00	.00	4.63	26.30	25.00	8.33	1.85	.93	.00	.19
5 TO 9	2.96	1.30	.74	.19	.00	.00	.37	5.56	7.41	4.07	1.67	.93	.19	.00
10- UP	.19	.19	.19	.00	.00	.00	.00	.56	1.67	2.04	1.11	.74	.56	.00
TOTAL	16.65	7.96	2.22	.37	.00	.00	5.00	32.41	34.07	14.44	4.63	2.59	.74	.19
ZERO CROSS														
TOTAL														
4.26 40.56														
1.48 15.74														
.00 6.11														
5.74 62.01														

TABLE 6.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF JUNE		NUMBER OBS. 540		HOUR 12		HOUR 14		HOUR 16	
TAILWIND LIMITS	1 TO 5 10 TO 15 20 TO 25 25-UP	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL
1 TO 5	1.07	1.07	12.04	.00	0.00	1.07	12.04	.00	0.00	1.07	12.04
10 TO 15	1.07	1.07	9.01	.00	0.00	1.07	9.01	.00	0.00	1.07	9.01
20 TO 25	1.07	1.07	8.70	.00	0.00	1.07	8.70	.00	0.00	1.07	8.70
25-UP	1.07	1.07	30.56	.37	1.19	1.07	30.56	.37	1.19	1.07	30.56
TOTAL	2.22	2.22	50.31	.37	1.19	2.22	50.31	.37	1.19	2.22	50.31
KSC PEAK WINDS											
TAILWINDS VS CROSSWINDS											
		MONTH OF JUNE		NUMBER OBS. 540		HOUR 12		HOUR 14		HOUR 16	
TAILWIND LIMITS	1 TO 5 10 TO 15 20 TO 25 25-UP	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL
1 TO 5	1.07	1.07	12.04	.00	0.00	1.07	12.04	.00	0.00	1.07	12.04
10 TO 15	1.07	1.07	9.01	.00	0.00	1.07	9.01	.00	0.00	1.07	9.01
20 TO 25	1.07	1.07	8.70	.00	0.00	1.07	8.70	.00	0.00	1.07	8.70
25-UP	1.07	1.07	30.56	.37	1.19	1.07	30.56	.37	1.19	1.07	30.56
TOTAL	2.22	2.22	50.31	.37	1.19	2.22	50.31	.37	1.19	2.22	50.31
KSC PEAK WINDS											
TAILWINDS VS CROSSWINDS											
		MONTH OF JUNE		NUMBER OBS. 540		HOUR 12		HOUR 14		HOUR 16	
TAILWIND LIMITS	1 TO 5 10 TO 15 20 TO 25 25-UP	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL
1 TO 5	1.07	1.07	12.04	.00	0.00	1.07	12.04	.00	0.00	1.07	12.04
10 TO 15	1.07	1.07	9.01	.00	0.00	1.07	9.01	.00	0.00	1.07	9.01
20 TO 25	1.07	1.07	8.70	.00	0.00	1.07	8.70	.00	0.00	1.07	8.70
25-UP	1.07	1.07	30.56	.37	1.19	1.07	30.56	.37	1.19	1.07	30.56
TOTAL	2.22	2.22	50.31	.37	1.19	2.22	50.31	.37	1.19	2.22	50.31
KSC PEAK WINDS											
TAILWINDS VS CROSSWINDS											
		MONTH OF JUNE		NUMBER OBS. 540		HOUR 12		HOUR 14		HOUR 16	
TAILWIND LIMITS	1 TO 5 10 TO 15 20 TO 25 25-UP	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL	ZERO CROSS	PERCENTAGES	1 TO 5 10 TO 15 20 TO 25 25-UP	TOTAL
1 TO 5	1.07	1.07	12.04	.00	0.00	1.07	12.04	.00	0.00	1.07	12.04
10 TO 15	1.07	1.07	9.01	.00	0.00	1.07	9.01	.00	0.00	1.07	9.01
20 TO 25	1.07	1.07	8.70	.00	0.00	1.07	8.70	.00	0.00	1.07	8.70
25-UP	1.07	1.07	30.56	.37	1.19	1.07	30.56	.37	1.19	1.07	30.56
TOTAL	2.22	2.22	50.31	.37	1.19	2.22	50.31	.37	1.19	2.22	50.31

TABLE 6.3. (Continued)

[illegible][illegible][illegible]

TABLE 6.3. (Concluded)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF JUNE					
HOUR 21		NUMBER OBS. 540															
		RUNWAY 15										RUNWAY 33					
		*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***					
		PERCENTAGES										PERCENTAGES					
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL *	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4		5.93	5.19	1.48	.93	.00	.00	.74	14.26	17.41	7.41	2.59	.93	.00	.00	1.67	30.00
5 TO 9		1.48	.74	.00	.37	.00	.00	.56	3.15	12.96	10.00	2.41	1.67	.00	.00	3.70	30.74
10- UP		.56	.56	.37	.37	.00	.19	.00	2.04	8.70	5.56	2.41	.74	.37	.19	.56	18.52
TOTAL		7.96	6.48	1.85	1.67	.00	.19	1.30	19.44	39.07	22.96	7.41	3.33	.37	.19	5.93	79.26
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF JUNE					
HOUR 22		NUMBER OBS. 540															
		RUNWAY 15										RUNWAY 33					
		*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***					
		PERCENTAGES										PERCENTAGES					
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL *	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4		7.04	2.41	1.48	.00	.00	.00	1.48	12.41	17.41	9.26	1.48	1.11	.19	.00	1.67	31.11
5 TO 9		.74	.37	.37	.56	.00	.00	.74	2.78	15.37	9.07	3.15	1.11	.00	.00	5.74	34.44
10- UP		.56	.74	.00	.19	.00	.00	.19	1.67	6.67	4.81	2.41	.56	.19	.37	.56	15.56
TOTAL		8.33	3.52	1.85	.74	.00	.00	2.41	16.85	39.44	23.15	7.04	2.78	.37	.37	7.96	81.11
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF JUNE					
HOUR 23		NUMBER OBS. 540															
		RUNWAY 15										RUNWAY 33					
		*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***					
		PERCENTAGES										PERCENTAGES					
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL *	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4		6.48	4.44	.37	.19	.19	.00	2.22	13.89	16.85	9.44	1.67	.74	.19	.00	2.41	31.30
5 TO 9		2.22	1.30	.19	.19	.19	.00	1.11	5.19	13.89	10.74	1.85	1.11	.19	.00	5.00	32.78
10- UP		.37	.37	.00	.19	.00	.00	.00	.93	6.11	3.15	1.85	.93	.37	.56	.56	13.52
TOTAL		9.07	6.11	.56	.56	.37	.00	3.33	20.00	36.85	23.33	5.37	2.78	.74	.56	7.96	77.59

TABLE 6.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END

HRS	KSC PEAK WINDS										HEAD/TAI WIND REVERSALS									
	MONTH OF JUNE					MONTH OF JUNE					MONTH OF JUNE					MONTH OF JUNE				
	*** RUNWAY 15 ***					*** RUNWAY 33 ***					*** RUNWAY 33 ***					*** RUNWAY 33 ***				
	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS
	TOTAL	HEAD-TAIL	TAIL-HEAD	TO TAIL	TO HEAD	TOTAL	HEAD-TAIL	TAIL-HEAD	TO TAIL	TO HEAD	TOTAL	HEAD-TAIL	TAIL-HEAD	TO TAIL	TO HEAD	TOTAL	HEAD-TAIL	TAIL-HEAD	TO TAIL	TO HEAD
00-02	10.70	6.80	3.90	8.72	17.70	11.50	3.77	7.73	16.09	10.10	11.50	3.77	7.73	16.09	10.10	11.50	3.77	7.73	16.09	10.10
03-05	13.42	7.98	5.44	11.50	17.78	14.16	5.44	8.72	15.17	13.45	14.16	5.44	8.72	15.17	13.45	14.16	5.44	8.72	15.17	13.45
06-08	13.73	7.30	6.43	11.72	17.05	14.59	7.92	6.68	19.66	11.18	14.59	7.92	6.68	19.66	11.18	14.59	7.92	6.68	19.66	11.18
09-11	14.47	5.94	8.53	9.45	24.96	14.59	8.53	6.06	22.81	9.68	14.59	8.53	6.06	22.81	9.68	14.59	8.53	6.06	22.81	9.68
12-14	13.48	5.75	7.73	8.03	27.23	13.48	7.73	5.75	26.88	8.07	13.48	7.73	5.75	26.88	8.07	13.48	7.73	5.75	26.88	8.07
15-17	12.18	5.50	6.68	7.18	28.57	12.12	6.62	5.50	27.96	7.22	12.12	6.62	5.50	27.96	7.22	12.12	6.62	5.50	27.96	7.22
18-20	10.62	5.13	5.69	6.49	27.14	10.82	5.57	5.26	25.35	6.74	10.82	5.57	5.26	25.35	6.74	10.82	5.57	5.26	25.35	6.74
21-23	12.49	6.25	6.25	7.69	33.33	13.61	6.86	6.74	33.23	8.50	13.61	6.86	6.74	33.23	8.50	13.61	6.86	6.74	33.23	8.50
00-23	12.66	6.33	6.33	8.72	23.13	13.11	6.56	6.56	22.66	9.22	13.11	6.56	6.56	22.66	9.22	13.11	6.56	6.56	22.66	9.22

6.4A

KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS
MONTH OF JUNE

HRS	*** RUNWAY 15 ***					*** RUNWAY 33 ***				
	GIVEN A HEADWIND	RESULTANT TAILWIND MAGNITUDE	GIVEN A HEADWIND	RESULTANT TAILWIND MAGNITUDE	TOTAL	GIVEN A HEADWIND	RESULTANT TAILWIND MAGNITUDE	GIVEN A HEADWIND	RESULTANT TAILWIND MAGNITUDE	TOTAL
	> 0 - 3	4 - 8	> 8	TOTAL		> 0 - 3	4 - 8	> 8	TOTAL	
00-02	6.84	1.74	.16	8.72	11.35	11.35	4.22	.53	16.09	16.09
03-05	9.96	1.34	.18	11.50	11.42	11.42	3.16	.88	15.47	15.47
06-08	8.34	2.68	.70	11.72	13.98	13.98	5.22	.96	19.66	19.66
09-11	5.81	2.46	1.18	9.45	13.06	13.06	7.27	2.48	22.81	22.81
12-14	3.97	2.33	1.73	8.03	13.55	13.55	9.03	4.50	26.88	26.88
15-17	3.31	1.86	2.02	7.18	13.28	13.28	8.33	6.25	27.86	27.86
18-20	3.99	1.64	.86	6.49	17.18	17.18	6.20	1.97	25.35	25.35
21-23	5.71	1.66	.38	7.69	21.56	21.56	10.48	1.20	33.23	33.23
00-23	5.90	1.93	.89	8.72	14.03	14.03	6.49	2.14	22.66	22.66

6.4B

TABLE 6.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY COMPONENT CLASS (NOTES)	MONTH OF JUNE											
	MAY				JUNE				JULY			
	HOURS 00-01 C/F	HOURS 01-02 C/F	HOURS 02-03 C/F	HOURS 03-04 C/F	HOURS 04-05 C/F	HOURS 05-06 C/F	HOURS 06-07 C/F	HOURS 07-08 C/F	HOURS 08-09 C/F	HOURS 09-10 C/F	HOURS 10-11 C/F	HOURS 11-12 C/F
U-1	11.98	7.38	2.76	2.74	5.92	17.67	7.79	6.88	5.97	10.20	10.20	10.20
1-2	21.29	16.67	12.49	10.06	14.31	29.65	19.93	21.94	19.79	23.35	23.35	23.35
2-3	31.98	19.00	14.56	12.64	19.31	43.78	27.02	25.59	24.98	31.42	31.42	31.42
3-4	41.09	25.10	20.16	16.83	25.13	57.95	39.60	35.05	31.77	41.24	41.24	41.24
4-5	51.58	29.43	24.55	21.26	30.91	65.90	43.49	42.80	40.89	49.79	49.79	49.79
5-6	60.50	31.30	32.47	28.10	36.74	76.50	51.57	50.52	50.52	58.80	58.80	58.80
6-7	67.33	42.91	38.59	33.66	44.75	82.03	57.83	56.99	57.35	65.07	65.07	65.07
7-8	74.77	49.02	41.95	38.73	49.70	86.64	63.10	61.20	61.20	69.43	69.43	69.43
8-9	78.91	55.41	47.11	45.09	55.70	90.94	70.02	68.68	66.15	75.08	75.08	75.08
9-10	84.46	66.63	56.50	54.19	64.55	95.70	79.08	77.63	72.66	81.44	81.44	81.44
10-11	87.33	72.15	61.41	58.45	68.95	97.08	84.35	80.00	76.82	85.00	85.00	85.00
11-12	94.40	78.44	64.13	64.49	74.55	97.08	89.95	80.00	78.91	87.94	87.94	87.94
12-13	91.78	83.56	73.99	70.93	79.29	94.62	94.40	89.03	86.84	93.50	93.50	93.50
13-14	93.66	88.09	79.64	76.73	84.01	99.23	97.33	90.97	87.24	94.68	94.68	94.68
14-15	95.05	91.34	84.75	80.52	87.42	99.54	97.36	91.83	89.04	95.35	95.35	95.35
15-16	95.54	93.50	88.80	83.74	90.00	99.69	97.86	94.19	90.16	96.25	96.25	96.25
16-17	96.93	95.67	91.49	86.96	92.55	99.69	97.86	93.05	90.16	96.25	96.25	96.25
17-18	97.23	96.56	93.80	89.61	94.04	99.69	97.86	93.05	90.16	96.25	96.25	96.25
18-19	97.52	97.54	94.66	92.51	95.37	99.69	97.86	93.05	90.16	96.25	96.25	96.25
19-20	97.82	98.23	96.47	94.93	96.75	99.69	97.86	93.05	90.16	96.25	96.25	96.25
20-21	98.22	98.43	97.07	96.22	97.40	99.69	97.86	93.05	90.16	96.25	96.25	96.25
21-22	98.71	98.82	97.59	96.75	98.17	99.69	97.86	93.05	90.16	96.25	96.25	96.25
22-23	98.81	98.92	97.93	97.11	98.58	99.69	97.86	93.05	90.16	96.25	96.25	96.25
23-24	98.91	99.21	98.45	97.44	98.71	99.69	97.86	93.05	90.16	96.25	96.25	96.25
24-25	99.31	99.41	99.14	98.52	99.35	99.69	97.86	93.05	90.16	96.25	96.25	96.25
25-26	99.61	99.61	99.48	98.84	99.71	99.69	97.86	93.05	90.16	96.25	96.25	96.25
26-27	99.70	99.70	99.64	99.44	99.80	99.69	97.86	93.05	90.16	96.25	96.25	96.25
27-28	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
28-29	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
29-30	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
30-31	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
31-32	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
32-33	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
33-34	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
34-35	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
35-36	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
36-37	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
37-38	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
38-39	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
39-40	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
40-41	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
41-42	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
42-43	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
43-44	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
44-45	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
45-46	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
46-47	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
47-48	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
48-49	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
49-50	99.70	99.70	99.74	99.44	99.84	99.69	97.86	93.05	90.16	96.25	96.25	96.25
50-51	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
NOBS	1010	1016	1161	1242	4429	651	607	465	304	2107	2107	2107

TABLE 7.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33		KSC PEAK WINDS MONTH OF JULY												CROSSWINDS	
		CROSSWIND												ZERO	
		CRITICAL LIMITS IN KNOTS												CROSSWIND	
		PERCENTAGES													
HRS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25	ABOVE							
00-02		53.82	23.78	9.48	.60	.00	.00	.00						17.32	1674
03-05		56.33	21.27	3.94	.96	.00	.00	.00						17.50	1674
06-08		43.34	32.04	9.44	1.43	.00	.00	.00						13.63	1673
09-11		27.20	40.47	21.46	4.78	.48	.00	.00						55.62	1673
12-14		22.28	36.20	30.76	7.17	1.08	.66	.00						1.85	1674
15-17		22.52	39.90	27.00	5.68	1.61	.54	.00						2.75	1674
18-20		45.10	32.08	9.32	2.87	.54	.42	.00						9.68	1674
21-23		54.42	23.66	4.90	.84	.30	.12	.00						15.77	1674
00-23		40.63	31.17	13.91	3.04	.52	.22	.00						10.52	13390

TABLE 7.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

		KSC PEAK WINDS				MONTH OF		JULY				TAILWINDS			
		RUNWAY 15								RUNWAY 33					
		TAILWIND								TAILWIND					
		CRITICAL LIMITS IN KNOTS								CRITICAL LIMITS IN KNOTS					
		PERCENTAGES								PERCENTAGES					
		1 TO 4				5 TO 9				10 ABOVE					
		TOTAL				TOTAL				TOTAL					
		NUMBER				NUMBER				NUMBER					
		OBS.				OBS.				OBS.					
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TABLE 7.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

[illegible]

TABLE 7.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS												
		MONTH OF JULY												
HOUR 3		NUMBER OBS. 558												
				RUNWAY 15		RUNWAY 33								
				*** CROSSWIND LIMITS ***		*** CROSSWIND LIMITS ***								
				1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	ZERO CROSS	TOTAL	
				PERCENTAGES		PERCENTAGES								
1 TO 4	9.14	4.12	1.06	.18	.00	2.15	16.67	34.05	6.78	1.97	.36	.00	4.84	50.00
5 TO 9	1.43	.72	.18	.00	.00	.18	2.51	10.04	6.09	.36	.18	.00	4.12	20.79
10- UP	.00	.00	.18	.00	.00	.00	.18	2.33	1.79	.72	.00	.00	.00	4.84
TOTAL	10.57	4.84	1.43	.18	.00	2.33	19.35	46.42	16.67	3.05	.34	.00	8.96	75.63

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS												
		MONTH OF JULY												
HOUR 4		NUMBER OBS. 558												
				RUNWAY 15		RUNWAY 33								
				*** CROSSWIND LIMITS ***		*** CROSSWIND LIMITS ***								
				1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	ZERO CROSS	TOTAL	
				PERCENTAGES		PERCENTAGES								
1 TO 4	9.14	4.84	1.43	.18	.00	1.25	16.85	32.97	10.93	1.25	.18	.00	5.73	51.08
5 TO 9	1.43	.54	.00	.36	.00	.18	2.51	10.04	5.38	.72	.54	.00	2.87	19.53
10- UP	.00	.00	.00	.00	.00	.00	.00	1.43	1.08	.36	.00	.00	.18	3.05
TOTAL	10.57	5.38	1.43	.54	.00	1.43	19.35	44.44	17.38	2.33	.72	.00	8.78	73.66

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS												
		MONTH OF JULY												
HOUR 5		NUMBER OBS. 558												
				RUNWAY 15		RUNWAY 33								
				*** CROSSWIND LIMITS ***		*** CROSSWIND LIMITS ***								
				1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	ZERO CROSS	TOTAL	
				PERCENTAGES		PERCENTAGES								
1 TO 4	9.50	4.84	1.61	.00	.00	2.51	18.46	36.56	9.32	.72	.54	.00	5.02	52.15
5 TO 9	1.25	.36	.00	.00	.00	.72	2.33	7.89	4.12	.54	.36	.00	2.15	15.05
10- UP	.00	.00	.18	.00	.00	.00	.18	1.79	.90	.54	.00	.00	.18	3.41
TOTAL	10.75	5.20	1.79	.00	.00	3.23	20.97	46.24	14.34	1.79	.90	.00	7.35	70.61

TABLE 7.3. (Continued)

KSC PEAK WINDS															TAILWINDS VS CROSSWINDS														
MONTH OF JULY															MONTH OF JULY														
HOUR 6															HOUR 7														
NUMBER OBS. 558															NUMBER OBS. 558														
TAILWIND LIMITS ***															TAILWIND LIMITS ***														
RUNWAY 15															RUNWAY 33														
*** CROSSWIND LIMITS ***															*** CROSSWIND LIMITS ***														
PERCENTAGES															PERCENTAGES														
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL						
11.47	3.94	1.43	.18	.00	.00	2.69	19.71	34.77	8.06	.54	.36	.00	.00	.00	5.38	49.10													
1.61	1.25	.00	.00	.00	.00	.36	3.41	6.63	3.76	1.25	.00	.00	.00	.00	2.51	14.16													
.00	.00	.00	.18	.00	.00	.00	.18	2.15	.72	1.08	.18	.00	.00	.00	.00	4.12													
13.08	5.20	1.61	.36	.00	.00	3.05	23.36	43.55	12.54	2.67	.54	.00	.00	.00	7.89	67.38													
KSC PEAK WINDS															KSC PEAK WINDS														
MONTH OF JULY															MONTH OF JULY														
HOUR 7															HOUR 8														
NUMBER OBS. 558															NUMBER OBS. 557														
TAILWIND LIMITS ***															TAILWIND LIMITS ***														
RUNWAY 15															RUNWAY 33														
*** CROSSWIND LIMITS ***															*** CROSSWIND LIMITS ***														
PERCENTAGES															PERCENTAGES														
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL						
5.06	7.53	1.61	.00	.00	.00	1.61	18.82	19.71	12.90	2.69	.54	.00	.00	.00	2.15	37.99													
2.33	1.25	.72	.16	.00	.00	.90	5.38	9.68	11.65	3.23	.36	.00	.00	.00	2.69	27.60													
.72	.54	.36	.00	.00	.00	.00	1.61	2.51	.90	1.25	.16	.00	.00	.00	.18	5.02													
11.11	9.32	2.69	.18	.00	.00	2.51	25.81	31.90	25.45	7.17	1.08	.00	.00	.00	5.02	70.61													
KSC PEAK WINDS															KSC PEAK WINDS														
MONTH OF JULY															MONTH OF JULY														
HOUR 8															HOUR 8														
NUMBER OBS. 557															NUMBER OBS. 557														
TAILWIND LIMITS ***															TAILWIND LIMITS ***														
RUNWAY 15															RUNWAY 33														
*** CROSSWIND LIMITS ***															*** CROSSWIND LIMITS ***														
PERCENTAGES															PERCENTAGES														
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL						
2.15	7.18	2.69	.36	.00	.00	1.08	13.46	6.48	15.98	3.59	.72	.00	.00	.00	1.26	27.83													
3.41	2.15	1.62	.00	.00	.00	.72	7.90	11.85	14.00	5.39	.54	.00	.00	.00	4.31	36.09													
.72	1.44	.18	.00	.00	.00	.36	2.69	5.92	2.87	.54	.00	.36	.00	.00	1.28	11.31													
6.48	10.77	4.49	.36	.00	.00	2.15	24.06	24.06	32.85	9.52	1.08	.36	.00	.00	6.64	75.22													

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TABLE 7.3. (Continued)

KSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JULY														
HOUR 9														
NUMBER OBS. 557														
RUNWAY 33														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1.97	7.00	4.49	1.26	.00	.00	.00	14.72	4.13	10.77	4.67	1.62	.00	.00	.00
3.77	3.05	1.80	.16	.00	.00	1.26	10.05	7.72	13.46	6.10	.18	.18	.00	3.77
.90	1.83	.18	.00	.00	.00	.00	2.87	8.60	6.64	2.69	.18	.18	.00	.72
6.14	11.85	6.46	1.44	.00	.00	1.26	27.65	20.65	30.88	13.46	1.97	.16	.00	4.49
TOTAL														
ZERO CROSS														
21.18														
31.42														
19.21														
71.81														
KSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JULY														
HOUR 10														
NUMBER OBS. 558														
RUNWAY 33														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1.01	6.99	3.58	.72	.18	.00	.00	13.06	2.15	8.24	6.45	2.15	.00	.00	.00
2.15	4.12	1.79	.00	.00	.00	.18	8.24	5.73	11.11	6.09	.90	.00	.00	3.94
.28	2.69	.72	.16	.00	.00	.00	4.12	13.98	9.32	1.61	1.08	.18	.00	1.25
4.30	15.80	6.09	.90	.18	.00	.18	25.45	21.86	28.67	14.16	4.12	.18	.00	5.20
TOTAL														
19.00														
27.78														
27.42														
74.19														
KSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JULY														
HOUR 11														
NUMBER OBS. 558														
RUNWAY 33														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
.36	4.84	4.66	1.61	.36	.00	.00	11.83	.36	5.56	5.91	1.43	.00	.00	.18
1.08	5.94	1.97	.36	.00	.00	.36	7.71	4.66	11.65	7.17	1.08	.18	.00	2.87
1.08	1.43	1.25	.00	.18	.00	.00	3.94	20.61	8.78	3.23	1.43	.00	.00	.72
2.51	10.22	7.89	1.97	.54	.00	.36	23.48	25.63	25.99	16.31	3.94	.18	.00	3.76
TOTAL														
13.44														
27.60														
36.77														
75.81														

TABLE 7.3. (Continued)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS													
MONTH OF JULY										MONTH OF JULY													
HOUR 12										HOUR 12													
NUMBER OBS. 558										NUMBER OBS. 558													
TAILWIND LIMITS ***										TAILWIND LIMITS ***													
RUNWAY 15										RUNWAY 33													
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***													
PERCENTAGES										PERCENTAGES													
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
.18	1.61	3.58	1.61	.00	.00	.00	6.99	.00	5.38	7.17	2.15	.36	.00	.00	15.05	.00	.00	.00	.00	.00	.00	.00	15.05
.54	3.76	1.61	.54	.18	.00	.18	6.81	.18	2.69	11.47	8.96	.54	.18	.18	25.45	.18	.18	.18	.18	.18	.18	.18	25.45
.50	2.87	1.08	.36	.00	.18	.00	5.38	.00	20.25	11.83	3.94	2.51	.00	.00	39.78	.00	.00	.00	.00	.00	.00	.00	39.78
1.01	8.24	6.27	2.51	.18	.18	.18	19.18	.18	22.94	28.67	20.07	5.20	.54	.18	80.29	.18	.18	.18	.18	.18	.18	.18	80.29
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS													
MONTH OF JULY										MONTH OF JULY													
HOUR 13										HOUR 13													
NUMBER OBS. 558										NUMBER OBS. 558													
TAILWIND LIMITS ***										TAILWIND LIMITS ***													
RUNWAY 15										RUNWAY 33													
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***													
PERCENTAGES										PERCENTAGES													
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
.18	1.61	4.66	1.43	.36	.18	.00	8.42	.18	2.87	9.86	2.15	.00	.00	.00	15.05	.00	.00	.00	.00	.00	.00	.00	15.05
1.08	1.79	1.97	.18	.18	.36	.00	5.56	.36	11.11	10.22	1.25	.18	.36	.72	25.63	.36	.36	.36	.36	.36	.36	.36	25.63
.72	1.25	1.25	.72	.18	.18	.00	4.30	.18	18.28	16.67	4.66	.90	.18	.00	41.04	.18	.18	.18	.18	.18	.18	.18	41.04
1.97	4.66	7.89	2.33	.72	.72	.00	18.26	.72	20.25	30.65	24.73	4.30	.36	1.08	81.72	.36	.36	.36	.36	.36	.36	.36	81.72
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS													
MONTH OF JULY										MONTH OF JULY													
HOUR 14										HOUR 14													
NUMBER OBS. 558										NUMBER OBS. 558													
TAILWIND LIMITS ***										TAILWIND LIMITS ***													
RUNWAY 15										RUNWAY 33													
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***													
PERCENTAGES										PERCENTAGES													
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
.36	1.43	4.30	1.61	.18	.00	.00	7.49	.00	3.05	7.53	1.97	.36	.00	.00	13.08	.00	.00	.00	.00	.00	.00	.00	13.08
.72	1.79	1.79	.72	.00	.18	.00	5.20	.18	1.97	8.78	9.68	1.61	.18	.72	23.12	.18	.18	.18	.18	.18	.18	.18	23.12
1.25	3.05	1.61	.18	.36	.18	.00	6.63	.18	15.59	18.28	8.42	1.08	.36	.36	44.09	.36	.36	.36	.36	.36	.36	.36	44.09
2.33	6.27	7.71	2.51	.54	.36	.00	19.71	.36	17.74	30.11	25.63	4.66	.90	1.08	80.29	.90	.90	.90	.90	.90	.90	.90	80.29

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TABLE 7.3. (Continued)

TAILWINDS VS CROSSWINDS														
MONTH OF JULY														
NUMBER OBS. 558														
HOUR 15														
MSC PEAK WINDS														
TAILWIND LIMITS ***														
RUNWAY 15														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP														
TOTAL														
1 TO 4	.35	1.61	2.33	1.79	.36	.00	.00	6.45	.90	3.76	6.63	2.15	.00	.00
5 TO 9	.72	1.43	1.08	.36	.18	.18	.18	4.12	1.25	11.47	12.19	.90	.18	.18
10- UP	1.08	2.87	.54	.18	.54	.18	.00	5.38	13.98	14.28	6.96	.72	.18	.18
TOTAL	2.15	5.91	3.94	2.33	1.08	.36	.18	15.95	16.13	33.51	27.78	3.76	.54	.36
HOUR 16														
MSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JULY														
NUMBER OBS. 558														
HOUR 16														
MSC PEAK WINDS														
TAILWIND LIMITS ***														
RUNWAY 16														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP														
TOTAL														
1 TO 4	.54	2.33	2.67	.54	.00	.00	.00	6.27	.72	3.41	5.38	1.61	.00	.00
5 TO 9	.54	1.25	2.15	.36	.72	.36	.36	5.38	2.87	11.93	10.39	1.61	.18	.18
10- UP	1.43	3.23	1.43	.54	.36	.00	.00	8.99	15.59	16.67	7.17	1.25	.36	.36
TOTAL	2.51	6.81	6.45	1.43	1.08	.36	.36	18.64	19.18	31.90	22.94	4.48	.54	.54
HOUR 17														
MSC PEAK WINDS														
TAILWINDS VS CROSSWINDS														
MONTH OF JULY														
NUMBER OBS. 558														
HOUR 17														
MSC PEAK WINDS														
TAILWIND LIMITS ***														
RUNWAY 17														
*** CROSSWIND LIMITS ***														
PERCENTAGES														
1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP														
TOTAL														
1 TO 4	.36	2.51	3.05	1.08	.36	.00	.00	7.35	2.87	4.12	3.94	1.25	.18	.00
5 TO 9	.54	1.97	.54	.72	.00	.00	.36	4.12	3.58	12.01	7.17	.90	.36	.36
10- UP	.72	1.97	1.08	.72	.72	.00	.18	5.38	19.53	19.00	4.12	.36	.00	.00
TOTAL	1.61	6.45	4.66	2.51	1.08	.36	.54	16.85	25.99	35.13	15.23	2.51	.54	.36

TABLE 7.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF JULY									
HOUR 18		NUMBER OBS. 550									
		RUNWAY 33									
		*** CROSSWIND LIMITS ***									
TAILWIND LIMITS		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
		PERCENTAGES									
1 TO 4		1.43	2.69	2.51	.90	.00	.54	0.42	5.73	6.09	2.11
5 TO 9		1.25	1.61	.72	.36	.18	.00	4.48	8.42	13.44	5.20
10- UP		1.43	1.79	1.79	.54	.18	.00	5.91	15.71	12.90	.61
TOTAL		4.12	6.09	5.02	1.79	.36	.54	10.02	25.87	32.44	9.32
		PERCENTAGES									
		1.08	.00	.00	.00	.00	.00	.00	.00	.00	.00
ZERO CROSS		.18	15.59								
TOTAL		2.69	29.75								
		.18	35.13								
ZERO CROSS		3.05	80.47								
		PERCENTAGES									
		1.79	.00	.00	.00	.00	.00	.00	.00	.00	.00

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF JULY									
HOUR 19		NUMBER OBS. 550									
		RUNWAY 33									
		*** CROSSWIND LIMITS ***									
TAILWIND LIMITS		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
		PERCENTAGES									
1 TO 4		4.10	4.12	1.43	.54	.18	.00	10.93	8.96	6.45	1.97
5 TO 9		1.43	.54	.54	.36	.18	.00	3.56	16.05	11.83	2.33
10- UP		.90	1.97	.54	.18	.18	.18	4.12	14.16	5.73	.77
TOTAL		6.43	6.63	2.51	1.08	.54	.18	18.64	39.96	24.01	5.02
		PERCENTAGES									
		1.25	.54	.00	.00	.00	.00	.00	.00	.00	.00
ZERO CROSS		.18	20.97								
TOTAL		2.69	37.28								
		1.43	22.22								
ZERO CROSS		9.68	89.47								
		PERCENTAGES									
		1.25	.36	.00	.00	.00	.00	.00	.00	.00	.00

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF JULY									
HOUR 20		NUMBER OBS. 550									
		RUNWAY 33									
		*** CROSSWIND LIMITS ***									
TAILWIND LIMITS		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP									
		PERCENTAGES									
1 TO 4		5.02	3.23	1.25	.54	.00	.00	10.75	17.74	8.24	1.61
5 TO 9		1.61	1.25	.72	.00	.00	.00	4.12	13.98	8.60	1.43
10- UP		.54	.54	.36	.18	.18	.00	1.79	11.83	5.20	.72
TOTAL		7.17	5.02	2.33	.72	.18	.00	16.67	43.55	22.04	3.76
		PERCENTAGES									
		1.97	.54	.00	.00	.00	.00	.00	.00	.00	.00
ZERO CROSS		.18	31.00								
TOTAL		2.69	31.00								
		7.17	19.53								
ZERO CROSS		10.57	82.44								
		PERCENTAGES									
		1.97	.13	.00	.00	.00	.00	.00	.00	.00	.00

TABLE 7.3. (Concluded)

TAILWIND LIMITS				RUNWAY 15				KSC PEAK WINDS				MONTH OF JULY				TAILWINDS VS CROSSWINDS				NUMBER OBS. 550				RUNWAY 33				TOTAL							
LIMITS				PERCENTAGES				HOUR 21				ZERO CROSS				ZERO CROSS				PERCENTAGES				ZERO CROSS				TOTAL							
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10				
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10
1	10	4	5	10	4	5	10	10	4	5	10	10	4	5	10	10	4	5	10	10	4</														

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HEADWIND TO TAILWIND REVERSALS
MONTH OF JULY

MRS	*** RUNWAY 1C ***			*** RUNWAY 33 ***		
	GIVEN A HEADWIND			GIVEN A HEADWIND		
	RESULTANT TAILWIND	MAGNITUDE	TOTAL	RESULTANT TAILWIND	MAGNITUDE	TOTAL
	> 0 - 3	> 8	> 8	> 0 - 3	> 8	> 8
UU-02	5.62	1.15	.07	20.06	4.80	25.14
U3-05	7.17	.67	.00	14.77	4.03	19.02
U6-08	7.76	1.90	.40	20.25	7.64	28.93
C9-11	4.98	1.45	1.21	13.99	11.47	32.80
12-14	3.03	1.48	2.81	16.51	12.15	36.76
15-17	3.03	1.88	3.32	14.04	14.38	34.59
18-20	4.67	1.61	1.24	19.30	9.81	35.13
21-23	5.14	1.21	.21	21.22	10.29	33.12
UU-23	5.15	1.42	1.16	17.46	8.98	30.06

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TABLE 8.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY	MSC PEAK WINDS										TOTAL NUMBER OBS.	
	MONTH OF AUG.											
	CROSSWINDS											
HRS	CROSSWIND										ZERO CROSSWIND	
	PERCENTAGES											
	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE						
00-02	54.00	18.52	4.24	.30	.12	.00					18.62	1674
03-05	58.66	16.37	2.63	.54	.18	.00					21.62	1674
06-08	49.16	27.48	5.62	1.14	.48	.12					16.01	1674
09-11	27.60	41.82	16.94	3.25	.78	.24					7.29	1674
12-14	14.00	37.99	34.92	6.15	.78	.90					2.27	1674
15-17	16.22	39.60	31.24	5.14	1.55	1.19					2.75	1674
18-20	42.35	33.81	10.93	1.85	.72	.30					10.04	1674
21-23	54.36	20.73	5.62	1.49	.30	.12					17.38	1674
00-23	44.92	29.58	14.02	2.49	.61	.36					12.02	13392

TABLE 8.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

HRS	MSC PEAK WINDS MONTH OF AUG.									
	RUNWAY 15 TAILWIND					TAILWIND				
	CRITICAL LIMITS IN KNOTS					CRITICAL LIMITS IN KNOTS				
	1 TO 4	5 TO 9	10 ABOVE	PERCENTAGES		1 TO 4	5 TO 9	10 ABOVE	PERCENTAGES	
00-02	15.23	2.63	.36			48.15	24.91	3.35		
03-05	21.57	2.45	.54			47.73	17.84	2.85		
06-08	24.85	5.32	1.14			36.74	21.59	5.56		
09-11	13.80	10.99	3.88			19.47	49.03	21.51		
12-14	11.11	7.59	6.33			16.01	29.51	28.43		
15-17	12.31	6.81	6.09			18.46	28.49	26.70		
18-20	12.78	5.14	2.45			33.51	32.68	11.95		
21-23	12.37	2.81	1.25			44.50	28.02	6.21		
00-23	15.50	5.47	2.76			33.07	26.43	13.27		

RUNWAY 33		TAILWIND	
CRITICAL LIMITS IN KNOTS		PERCENTAGES	
1 TO 4	48.15	44.91	3.35
5 TO 9	47.73	17.84	2.45
10 ABOVE	36.74	21.39	5.56
	19.87	49.03	2.51
	16.01	29.51	28.43
	18.46	28.49	26.70
	33.51	32.68	11.95
	44.50	28.02	6.21
	33.07	26.43	13.27

TABLE 8.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF AUG.										MONTH OF AUG.									
HOUR 0										HOUR 0									
NUMBER OBS. 558										NUMBER OBS. 558									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	
1 TO 4	8.76	3.41	.72	.18	.00	.00	.72	14.16		1 TO 4	32.44	5.73	1.43	.00	.00	.00	6.45	46.06	
5 TO 9	.72	.72	.36	.00	.00	.00	.54	2.33		5 TO 9	14.52	6.45	1.79	.00	.00	.00	5.56	28.32	
10- UP	.18	.18	.19	.00	.00	.00	.00	.54		10- UP	1.79	1.08	.90	.00	.00	.00	.18	3.94	
TOTAL	9.66	4.30	1.25	.18	.00	.00	1.25	17.03		TOTAL	48.75	13.26	4.12	.00	.00	.00	12.19	78.32	
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF AUG.										MONTH OF AUG.									
HOUR 1										HOUR 1									
NUMBER OBS. 558										NUMBER OBS. 558									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	
1 TO 4	8.06	3.41	.36	.00	.00	.00	2.15	13.98		1 TO 4	32.80	8.42	.72	.00	.18	.00	6.63	48.75	
5 TO 9	.50	1.43	.00	.00	.00	.00	.36	2.69		5 TO 9	13.08	6.09	1.79	.00	.00	.00	4.66	25.63	
10- UP	.18	.18	.00	.00	.00	.00	.00	.36		10- UP	1.25	.90	.54	.36	.00	.00	.00	3.05	
TOTAL	9.14	5.02	.36	.00	.00	.00	2.51	17.03		TOTAL	47.13	15.41	3.05	.36	.18	.00	11.29	77.42	
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF AUG.										MONTH OF AUG.									
HOUR 2										HOUR 2									
NUMBER OBS. 558										NUMBER OBS. 558									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
PERCENTAGES										PERCENTAGES									
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	
1 TO 4	11.1	3.05	.18	.00	.00	.00	3.23	17.56		1 TO 4	34.41	7.71	1.61	.18	.00	.00	5.73	49.64	
5 TO 9	1.25	.72	.18	.00	.00	.00	.72	2.87		5 TO 9	11.11	5.02	1.43	.00	.00	.00	3.23	20.79	
10- UP	.18	.00	.00	.00	.00	.00	.00	.18		10- UP	1.08	1.08	.54	.18	.00	.00	.18	3.05	
TOTAL	12.54	3.76	.36	.00	.00	.00	3.94	20.61		TOTAL	46.59	13.80	3.58	.36	.00	.00	9.14	73.48	

TABLE 8.3. (Continued)

[illegible]

KSC PEAK WINDS			TAILWINDS VS CROSSWINDS			MONTH OF AUG.		
HOUR 4			NUMBER OBS. 558					
RUNWAY 15			RUNWAY 33					
*** CROSSWIND LIMITS ***			*** CROSSWIND LIMITS ***					
1	10	4	1	10	4	1	10	4
PERCENTAGES			PERCENTAGES					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS			ZERO CROSS					
TOTAL			TOTAL					
25- UP			25- UP					
ZERO CROSS								

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TABLE 8.3. (Continued)

MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
HOUR 15										MONTH OF AUG.									
RUNWAY 15										NUMBER OBS. 550									
TAILWIND LIMITS	*** CROSSWIND LIMITS ***					25- UP	ZERO CROSS	TOTAL *	RUNWAY 33					25- UP	ZERO CROSS	TOTAL			
	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24				PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19				20 TO 24	PERCENTAGES	
1 TO 4	.90	2.69	5.73	1.79	.18	.00	.00	11.29	* 1.08	5.20	8.24	1.79	.18	.72	.18	17.38			
5 TO 9	1.25	3.41	1.97	.00	.36	.18	.00	7.17	* 2.15	12.01	11.29	1.79	.18	.00	.00	27.42			
10- UP	1.79	1.97	1.61	.72	.00	.00	.00	6.09	* 9.32	11.47	6.09	1.25	.54	.54	.36	29.57			
TOTAL	3.94	8.06	9.32	2.51	.54	.18	.00	24.55	* 12.54	28.67	25.63	4.84	.90	1.25	.54	74.37			
MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
HOUR 16										MONTH OF AUG.									
RUNWAY 15										NUMBER OBS. 550									
TAILWIND LIMITS	*** CROSSWIND LIMITS ***					25- UP	ZERO CROSS	TOTAL *	RUNWAY 33					25- UP	ZERO CROSS	TOTAL			
	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24				PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19				20 TO 24	PERCENTAGES	
1 TO 4	2.15	4.66	5.73	.90	.54	.18	.00	14.16	* 2.33	4.48	7.89	1.79	.36	.00	.00	16.85			
5 TO 9	.90	2.33	2.15	.18	.18	.36	.18	6.27	* 2.87	11.29	11.47	1.61	.54	.18	1.25	29.21			
10- UP	2.33	2.33	1.79	.18	.18	.00	.00	8.81	* 8.04	11.83	4.66	.54	.00	.36	.18	25.63			
TOTAL	5.38	9.32	9.68	1.25	.90	.54	.18	27.24	* 13.26	27.60	24.01	3.94	.90	.54	1.43	71.68			
MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
HOUR 17										MONTH OF AUG.									
RUNWAY 15										NUMBER OBS. 550									
TAILWIND LIMITS	*** CROSSWIND LIMITS ***					25- UP	ZERO CROSS	TOTAL *	RUNWAY 33					25- UP	ZERO CROSS	TOTAL			
	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24				PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19				20 TO 24	PERCENTAGES	
1 TO 4	1.97	4.66	4.48	.36	.00	.00	.00	11.47	* 2.87	7.89	6.99	1.79	.00	.54	1.08	21.15			
5 TO 9	1.48	3.41	1.43	.00	.36	.18	.54	6.99	* 4.48	14.87	7.71	.54	.36	.00	.90	28.85			
10- UP	1.79	2.33	.90	.00	.36	.00	.00	5.38	* 7.35	12.90	3.58	.18	.36	.36	.18	24.91			
TOTAL	4.84	10.39	6.81	.36	.72	.18	.54	23.84	* 14.70	35.66	18.28	2.51	.72	.90	2.15	74.91			

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WASC PEAK WINDS TAILWINDS VS CROSSWINDS
MONTH OF AUG.

WINDS PEAK WINDS TAILWINDS VS CROSSWINDS
MONTH OF AUG.

WASC PEAK WINDS TAIL WINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 23										NUMBER OFS. 558									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1	10	5	TO 9	10T014	15T019	20T024	25-	UP	CROSS	1	10	5	TO 9	10T014	15T019	20T024	25-	UP	CROSS
PERCENTAGES										PERCENTAGES									
TAILWIND	7.35	2.87	.36	.00	.00	.00	.00	.00	1.25	11.83	.32	.44	6.45	2.33	.18	.00	.00	.00	5.91
LIMITS	1 TO 9	.36	.00	.00	.00	.00	.00	.00	.90	2.33	.10	.75	8.06	1.97	.18	.10	.00	.00	5.20
	5 TO 9	1.08	.00	.00	.00	.00	.00	.00	.00	1.25	1.43	2.51	14.3	.72	.36	.00	.00	.00	.36
	10T014	.72	.54	.00	.00	.00	.00	.00	.00	15.41	45.70	15.95	5.02	.72	.18	.00	.00	.00	11.47
TOTAL	9.14	3.76	.36	.00	.00	.00	.00	.00	.00	15.41	45.70	15.95	5.02	.72	.18	.00	.00	.00	11.47
																			79.03

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TABLE 8.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY COMPONENT CLASS TANDYST	HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF AUG.											
	RSC PEAK WINDS				*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	HOURS 05-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 05-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 05-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF
0-1	14.61	8.38	3.43	5.43	7.81	25.49	15.14	10.09	11.56	16.91	16.91	16.91
1-2	25.39	13.07	10.12	11.58	14.84	41.12	23.11	24.31	26.53	29.64	29.64	29.64
2-3	38.70	19.18	12.91	15.42	21.21	58.04	32.47	31.42	32.43	40.16	40.16	40.16
3-4	48.78	24.46	18.25	21.01	27.73	69.90	40.84	41.06	43.31	50.33	50.33	50.33
4-5	60.78	29.15	22.71	26.20	34.22	82.24	50.40	46.56	51.02	59.44	59.44	59.44
5-6	70.26	37.35	31.00	35.70	43.08	87.34	59.76	53.90	58.03	66.78	66.78	66.78
6-7	76.78	43.89	37.85	41.53	49.52	90.63	67.13	58.03	65.08	71.87	71.87	71.87
7-8	82.43	50.59	42.75	47.28	55.51	92.93	74.30	61.24	67.35	73.59	73.59	73.59
8-9	86.35	57.12	52.11	54.47	62.07	94.90	80.28	67.20	72.56	80.17	80.17	80.17
9-10	91.91	69.85	62.07	61.30	71.63	96.88	87.05	75.69	76.87	85.30	85.30	85.30
10-11	94.17	76.55	68.53	69.41	76.81	97.53	90.84	79.13	79.14	87.72	87.72	87.72
11-12	95.91	83.75	74.58	75.16	82.04	98.68	93.82	83.94	82.54	90.64	90.64	90.64
12-13	96.70	86.36	79.04	80.27	85.84	98.85	95.42	85.78	85.03	92.05	92.05	92.05
13-14	97.83	91.79	84.98	84.98	89.75	99.01	96.81	89.22	88.21	93.91	93.91	93.91
14-15	98.70	93.69	88.29	88.74	92.25	99.51	98.01	91.74	89.80	95.27	95.27	95.27
15-16	98.96	95.98	91.79	91.69	94.50	99.67	98.01	93.58	91.38	96.07	96.07	96.07
16-17	99.13	97.24	94.34	93.85	96.06	99.84	98.41	94.72	92.74	96.78	96.78	96.78
17-18	99.30	98.49	96.41	95.61	97.40	99.84	99.03	96.11	94.78	97.68	97.68	97.68
18-19	99.48	98.83	97.37	96.81	98.08	99.84	99.20	97.04	96.15	98.24	98.24	98.24
19-20	99.57	99.41	98.33	97.84	98.76	100.00	99.40	97.94	97.28	98.79	98.79	98.79
20-21	99.74	99.66	99.04	98.48	99.22	100.00	99.60	98.17	98.19	99.09	99.09	99.09
21-22	99.83	99.83	99.36	98.72	99.42	100.00	99.60	98.39	98.41	99.19	99.19	99.19
22-23	99.83	100.00	99.52	99.12	99.61	100.00	100.00	98.62	98.64	99.35	99.35	99.35
23-24	99.83	100.00	99.60	99.20	99.65	100.00	100.00	99.31	99.09	99.65	99.65	99.65
24-25	99.83	100.00	99.74	99.36	99.75	100.00	100.00	99.54	99.09	99.70	99.70	99.70
25-26	99.83	100.00	99.84	99.68	99.84	100.00	100.00	99.54	99.55	99.80	99.80	99.80
26-27	99.83	100.00	99.84	99.76	99.88	100.00	100.00	99.77	99.55	99.85	99.85	99.85
27-28	99.91	100.00	99.91	99.84	99.96	100.00	100.00	99.77	99.55	99.90	99.90	99.90
28-29	99.91	100.00	100.00	99.92	99.96	100.00	100.00	100.00	99.77	99.95	99.95	99.95
29-30	99.91	100.00	100.00	99.92	99.96	100.00	100.00	100.00	100.00	100.00	100.00	100.00
30-31	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
31-32	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
32-33	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
33-34	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
34-35	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
35-36	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
36-37	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
37-38	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
38-39	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
39-40	100.00	100.00	100.00	99.92	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
40-41	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
NOBS	1150	1194	1255	1252	4851	608	502	436	443	59.7	59.7	59.7

TABLE 9.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33		KSC PEAK WINDS MONTH OF SEPT.										CROSSWINDS		TOTAL NUMBER OBS.	
		CROSSWIND										ZERO			
		***** CRITICAL LIMITS IN KNOTS *****										CROSSWIND			
		PERCENTAGES													
		5 TO 9 10 TO 14 15 TO 19 20 TO 24 25 ABOVE													
MRS		1 10 4													
00-02	39.42	29.36	11.35	4.74	1.58	.99						12.57	1710		
03-05	46.78	24.33	10.58	3.80	.88	1.17						12.46	1710		
06-08	38.25	30.47	12.92	4.27	1.05	1.29						11.75	1710		
09-11	17.49	42.28	26.20	7.37	1.87	1.64						3.16	1710		
12-14	14.34	34.27	37.19	10.76	2.22	1.99						1.23	1710		
15-17	13.39	36.26	37.43	8.42	2.16	1.64						.70	1710		
18-20	30.06	37.25	16.26	6.73	1.70	1.81						6.20	1710		
21-23	37.08	29.77	13.86	6.32	2.11	1.40						9.47	1710		
00-23	29.35	33.00	20.72	6.55	1.70	1.49						7.19	13680		

TABLE 9.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

KSC PEAK WINDS										TAILWINDS		
MONTH OF										SEPT.		
RUNWAY 15										RUNWAY 33		
TAILWIND										TAILWIND		
CRITICAL LIMITS IN KNOTS										CRITICAL LIMITS IN KNOTS		
1 TO 4										1 TO 4		
5 TO 9										5 TO 9		
10 ABOVE										10 ABOVE		
PERCENTAGES										PERCENTAGES		
MMS												
00-02	16.96			7.13	3.22					37.31	23.39	8.60
03-05	24.91			8.77	3.22					37.25	14.56	6.61
06-08	28.07			11.99	4.27					20.36	16.08	6.61
09-11	17.95			15.26	10.29					20.23	20.35	15.61
12-14	14.04			12.51	14.62					17.84	20.23	20.35
15-17	15.20			10.41	13.92					15.53	25.85	15.09
18-20	15.73			8.48	9.06					31.35	24.04	10.76
21-23	16.43			7.25	5.32					35.44	24.85	9.53
00-23	18.66			10.23	7.99					28.54	21.17	11.64

RUNWAY 33		TAILWIND		CRITICAL LIMITS IN KNOTS		PERCENTAGES	
1	10	4	5	10	9	10	ABOVE
37.31			23.39				8.60
37.25			14.56				6.61
29.36			16.08				6.61
20.23			20.35				15.61
17.84			20.23				20.35
19.53			25.85				15.09
31.35			24.04				10.76
35.44			24.85				9.53
28.54			21.17				11.64

TABLE 9.3. (Continued)

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF SEPT.										MONTH OF SEPT.									
HOUR 3										NUMBER OBS. 570									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***				
1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP				
PERCENTAGES					PERCENTAGES					PERCENTAGES					PERCENTAGES				
1 TO 4	11.93	9.74	1.75	1.93	.53	.18	.70	21.75	21.58	10.00	2.63	1.40	.00	.00	2.46	2.46	38.07		
5 TO 9	3.51	2.11	.70	.18	.00	.00	1.75	8.42	5.79	6.32	2.81	.35	.00	.18	1.58	1.58	17.02		
10- UP	1.23	1.05	.53	.18	.00	.53	.00	3.68	2.11	1.58	1.58	.08	.18	.18	.18	.18	6.67		
TOTAL	16.67	7.89	2.98	2.28	.70	.88	2.46	33.86	29.47	17.89	7.02	2.63	.35	.35	4.21	4.21	61.78		

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF SEPT.										MONTH OF SEPT.									
HOUR 4										NUMBER OBS. 570									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***				
1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP				
PERCENTAGES					PERCENTAGES					PERCENTAGES					PERCENTAGES				
1 TO 4	14.74	6.14	1.40	.88	.18	.18	2.63	26.14	23.16	8.07	1.16	1.23	.18	.00	2.81	2.81	38.60		
5 TO 9	3.33	1.93	1.40	.35	.00	.35	1.05	8.42	3.33	4.56	2.98	.35	.18	.18	1.93	1.93	13.51		
10- UP	.70	1.05	.53	.00	.00	.35	.18	2.81	1.40	2.11	2.28	.35	.00	.18	.35	.35	6.67		
TOTAL	18.77	9.12	3.33	1.23	.18	.88	3.86	37.37	27.89	14.74	6.42	1.93	.35	.35	5.09	5.09	58.77		

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF SEPT.										MONTH OF SEPT.									
HOUR 5										NUMBER OBS. 570									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***					*** CROSSWIND LIMITS ***				
1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP					1 TO 5 TO 9 10T014 15T019 20T024 25- UP				
PERCENTAGES					PERCENTAGES					PERCENTAGES					PERCENTAGES				
1 TO 4	15.44	5.44	1.40	.88	.18	.35	3.16	26.84	21.58	8.07	2.11	1.05	.00	.00	2.28	2.28	35.09		
5 TO 9	4.56	2.28	1.58	.00	.00	.00	1.05	9.47	3.51	4.91	2.98	.35	.35	.18	.08	.08	13.16		
10- UP	.35	.88	.70	.35	.35	.35	.18	3.16	2.11	1.75	1.23	.70	.35	.18	.18	.18	6.49		
TOTAL	20.35	8.60	3.68	1.23	.53	.70	4.39	39.47	27.19	14.74	6.32	2.11	.70	.35	3.33	3.33	54.74		

TABLE 9.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF SEPT.		NUMBER OBS.		570					
HOUR 6											

TABLE 9.3. (Continued)

TAILWIND LIMITS		RUNWAY 15					CROSSWIND LIMITS ***					MSR PEAK WINDS					MONTH OF SEPT.					TAILWINDS VS CROSSWINDS					TOTAL				
1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP		ZERO CROSS		TOTAL		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP		ZERO CROSS			
PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES		PERCENTAGES			
1 TO 4	3-33	5 TO 9	9-30	10 TO 14	4-21	15 TO 19	1-40	20 TO 24	5-3	25- UP	1-18	ZERO CROSS	18-95	TOTAL	1-93	1 TO 4	10-08	5 TO 9	5-44	10 TO 14	1-93	15 TO 19	5-3	20 TO 24	5-3	25- UP	1-18	ZERO CROSS	21-05		
5 TO 9	3-51	10 TO 14	7-02	15 TO 19	1-93	20 TO 24	1-23	25- UP	3-5	ZERO CROSS	1-58	15-61	3-68	10-00	5-96	3-5	10-00	5-33	5-96	3-5	10-00	5-33	5-96	3-5	10-00	5-33	5-96	3-5	10-00	5-33	
10- UP	3-68	15 TO 19	3-16	20 TO 24	1-05	25- UP	1-00	ZERO CROSS	1-18	3-5	5-3	8-95	4-39	8-21	3-33	8-95	4-39	8-21	3-33	8-95	4-39	8-21	3-33	8-95	4-39	8-21	3-33	8-95	4-39	8-21	3-33
TOTAL	10-33	19-47	7-19	2-63	1-05	5-3	1-00	2-63	1-05	5-3	2-11	43-51	10-00	25-09	14-74	3-16	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3

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TAILWIND LIMITS	MSC PEAK WINDS				MONTH OF SEPT.	TAILWINDS VS CROSSWINDS				NUMBER OBS.	570	RUNWAY 33				ZERO CROSS	TOTAL
	HOUR 11					PERCENTAGES						PERCENTAGES					
	1	10	5	10		1 TO 5	5 TO 10	10 TO 15	15 TO 20			1 TO 5	5 TO 10	10 TO 15	15 TO 20		
1	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
2	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
3	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
4	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
5	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
6	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
7	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
8	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
9	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
10	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
11	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
12	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
13	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
14	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
15	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
16	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
17	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
18	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
19	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
20	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
21	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
22	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
23	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
24	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
25	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
26	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
27	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
28	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
29	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
30	10	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
TOTAL	68.14	21.23	10.53	3.33	1.40	.35	43.86	7.37	19.30	5.96	1.23	1.02	1.58	55.79			
10-UP	2.63	6.67	1.75	.18	.00	.10	11.40	5.79	5.09	4.91	1.23	.18	.35	18.07			
5 TO 9	2.28	7.89	3.16	.53	.00	.35	14.74	1.23	8.60	5.44	1.93	.70	.53	19.47			
1 TO 4	1.23	6.67	5.61	2.63	.70	.00	17.72	.35	5.61	8.95	2.81	.35	.10	18.25			
ZERO CROSS																	

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TABLE 9.3. (Continued)

MSC PEAK WINDS		TAILWINDS VS CROSSWINDS										NUMBER OBS. 570	
MONTH OF SEPT.		MONTH OF SEPT.										HOUR 15	
HOUR 15		HOUR 15										HOUR 16	
HOUR 16		HOUR 16										HOUR 17	
HOUR 17		HOUR 17										HOUR 18	
HOUR 18		HOUR 18										HOUR 19	
HOUR 19		HOUR 19										HOUR 20	
HOUR 20		HOUR 20										HOUR 21	
HOUR 21		HOUR 21										HOUR 22	
HOUR 22		HOUR 22										HOUR 23	
HOUR 23		HOUR 23										HOUR 24	
HOUR 24		HOUR 24										HOUR 25	
HOUR 25		HOUR 25										HOUR 26	
HOUR 26		HOUR 26										HOUR 27	
HOUR 27		HOUR 27										HOUR 28	
HOUR 28		HOUR 28										HOUR 29	
HOUR 29		HOUR 29										HOUR 30	
HOUR 30		HOUR 30										HOUR 31	
HOUR 31		HOUR 31										HOUR 32	
HOUR 32		HOUR 32										HOUR 33	
HOUR 33		HOUR 33										HOUR 34	
HOUR 34		HOUR 34										HOUR 35	
HOUR 35		HOUR 35										HOUR 36	
HOUR 36		HOUR 36										HOUR 37	
HOUR 37		HOUR 37										HOUR 38	
HOUR 38		HOUR 38										HOUR 39	
HOUR 39		HOUR 39										HOUR 40	
HOUR 40		HOUR 40										HOUR 41	
HOUR 41		HOUR 41										HOUR 42	
HOUR 42		HOUR 42										HOUR 43	
HOUR 43		HOUR 43										HOUR 44	
HOUR 44		HOUR 44										HOUR 45	
HOUR 45		HOUR 45										HOUR 46	
HOUR 46		HOUR 46										HOUR 47	
HOUR 47		HOUR 47										HOUR 48	
HOUR 48		HOUR 48										HOUR 49	
HOUR 49		HOUR 49										HOUR 50	
HOUR 50		HOUR 50										HOUR 51	
HOUR 51		HOUR 51										HOUR 52	
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HOUR 91		HOUR 91										HOUR 92	
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HOUR 93		HOUR 93										HOUR 94	
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HOUR 137		HOUR 137										HOUR 138	
HOUR 138		HOUR 138										HOUR 139	
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HOUR 274		HOUR 274										HOUR 275	
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HOUR 276		HOUR 276										HOUR 277	
HOUR 277		HOUR 277										HOUR 278	
HOUR 278		HOUR 278										HOUR 279	
HOUR 279		HOUR 279										HOUR 280	
HOUR 280		HOUR 280										HOUR 281	
HOUR 281		HOUR 281										HOUR 28	

TABLE 9.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 18		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	1.93	7.19	4.39	1.05	.00	.35	.35	15.26	7.54	12.46	3.16	.70	.35
5 TO 9	2.11	4.39	1.93	.53	.18	.18	.35	9.65	5.26	12.28	4.39	1.23	.18
10- UP	3.51	4.21	1.40	.53	.18	.70	.18	10.70	3.68	3.33	2.46	.70	.53
TOTAL	7.54	15.79	7.72	2.11	.35	1.23	.88	35.61	16.49	28.07	10.00	4.39	1.23
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 19		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	3.86	6.84	2.81	1.75	.35	.00	.35	15.96	12.11	13.13	1.93	1.75	.35
5 TO 9	1.93	3.51	1.23	.88	.53	.00	.70	8.77	7.02	8.95	4.91	1.23	.18
10- UP	2.98	2.63	1.58	.35	.00	.88	.00	8.42	3.51	2.28	1.75	1.05	.35
TOTAL	8.77	12.98	5.61	2.98	.88	.88	1.05	33.16	22.63	24.56	8.60	4.04	.88
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 20		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 21		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 22		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 23		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 24		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 25		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 26		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 27		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 28		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 29		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 30		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 31		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 32		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53	.53	.00	8.07	2.98	2.28	3.68	.70	.35
TOTAL	8.45	10.00	4.91	3.68	1.23	1.05	1.93	31.05	26.49	20.35	11.93	2.98	.53
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS											
		MONTH OF SEPT.											
HOUR 33		NUMBER OBS.		570									
TAILWIND LIMITS	1 TO 4	RUNWAY 15											
		*** CROSSWIND LIMITS ***											
		15019 201024 25- UP											
		PERCENTAGES											
		15019 201024 25- UP											
1 TO 4	4.21	5.26	2.46	2.11	.35	.53	1.05	15.96	18.60	10.53	3.16	1.58	.00
5 TO 9	1.40	2.46	1.05	.88	.35	.00	.88	7.02	4.91	7.54	5.09	.70	.18
10- UP	2.63	2.28	1.40	.70	.53								

TABLE 9.3. (Concluded)

MSC PEAK WINDS										TAILWINDS VS CROSSWINDS														
MONTH OF SEPT.										MONTH OF SEPT.														
HOUR 21										HOUR 22														
NUMBER OBS. 570										NUMBER OBS. 570														
RUNWAY 15										RUNWAY 33														
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***														
PERCENTAGES										PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4	6.18	5.26	2.11	3.16	.18	.00	.88	17.72	16.44	11.23	2.98	1.93	.35	.18	1.75	35.26							1.75	35.26
5 TO 9	1.58	1.40	.88	.70	.35	.35	1.40	6.67	7.19	8.42	4.21	.70	.53	.00	3.86	24.91							3.86	24.91
10- UP	1.75	1.93	1.75	.35	.35	.35	.00	6.49	2.63	1.75	1.93	.70	.53	.35	.18	8.07							.18	8.07
TOTAL	9.47	8.60	4.74	4.21	.88	.70	2.28	30.88	26.67	21.40	9.12	3.33	1.40	.53	5.79	68.25							5.79	68.25
MSC PEAK WINDS										TAILWINDS VS CROSSWINDS														
MONTH OF SEPT.										MONTH OF SEPT.														
HOUR 22										HOUR 23														
NUMBER OBS. 570										NUMBER OBS. 570														
RUNWAY 15										RUNWAY 33														
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***														
PERCENTAGES										PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4	5.79	5.09	1.58	1.93	.18	.00	1.58	16.14	17.72	9.30	3.86	1.93	.35	.53	1.58	35.26							1.58	35.26
5 TO 9	1.23	1.93	1.75	.35	.18	.35	.88	6.67	7.89	9.30	3.86	.88	.35	.00	2.28	24.39							2.28	24.39
10- UP	1.40	1.40	1.58	.35	.18	.35	.18	5.44	3.33	2.28	2.63	.88	.70	.35	.70	10.88							.70	10.88
TOTAL	8.42	8.42	4.91	2.63	.53	.70	2.63	28.25	28.95	20.88	10.18	3.68	1.40	.88	4.56	70.53							4.56	70.53
MSC PEAK WINDS										TAILWINDS VS CROSSWINDS														
MONTH OF SEPT.										MONTH OF SEPT.														
HOUR 23										HOUR 23														
NUMBER OBS. 570										NUMBER OBS. 570														
RUNWAY 15										RUNWAY 33														
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***														
PERCENTAGES										PERCENTAGES														
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4	5.26	5.96	1.58	.88	.00	.00	1.75	15.44	18.95	8.42	3.51	1.93	.53	.35	2.11	35.79							2.11	35.79
5 TO 9	1.40	2.46	1.05	.88	.70	.35	1.58	8.42	7.19	6.77	4.39	.53	.53	.00	3.86	25.26							3.86	25.26
10- UP	1.40	1.40	.53	.35	.00	.35	.00	4.04	3.51	2.98	1.58	.53	.35	.35	.35	9.65							.35	9.65
TOTAL	8.07	9.82	3.16	2.11	.70	.70	3.33	27.89	29.65	20.18	9.47	2.98	1.40	.70	6.32	70.70							6.32	70.70

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TABLE 9.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY COMPONENT CLASS (KNOTS)	MONTH OF SEPT.											
	06-08				09-11				12-14			
	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF	HOURS CPF
0-1	15.76	7.19	4.37	3.87	7.66	17.32	6.28	4.92	4.59	8.63	19.93	8.63
1-2	27.84	17.18	13.72	13.15	17.81	28.66	16.15	16.17	17.46	19.93	28.35	19.93
2-3	39.29	22.57	17.89	16.67	24.38	31.83	25.63	20.39	23.37	28.35	37.89	28.35
3-4	48.53	29.71	24.45	26.89	32.16	41.83	33.51	29.54	32.54	37.89	46.04	37.89
4-5	59.24	36.34	31.01	32.30	39.44	51.10	41.66	34.74	38.46	46.04	59.06	46.04
5-6	66.39	45.03	38.97	42.55	47.98	61.39	49.27	41.91	47.99	59.06	75.07	59.06
6-7	72.58	51.14	43.84	49.90	54.12	70.08	56.07	45.85	51.92	75.07	88.91	75.07
7-8	78.74	57.35	48.11	55.71	59.73	76.50	62.62	50.21	58.48	88.91	100.00	88.91
8-9	82.88	63.56	56.46	64.70	66.70	84.32	68.62	56.96	64.79	100.00	100.00	100.00
9-10	88.13	72.36	65.41	75.05	75.09	91.10	76.50	64.84	75.07	100.00	100.00	100.00
10-11	90.23	78.47	71.27	79.30	79.69	92.80	80.11	68.44	78.18	100.00	100.00	100.00
11-12	92.02	82.51	77.93	81.82	83.45	95.00	84.11	72.57	81.33	100.00	100.00	100.00
12-13	93.80	86.75	83.30	85.78	87.32	96.46	87.85	75.95	84.30	100.00	100.00	100.00
13-14	94.75	90.27	87.87	89.16	90.50	97.20	91.32	80.31	87.48	100.00	100.00	100.00
14-15	95.90	93.06	90.16	91.88	92.70	97.68	93.59	83.12	89.58	100.00	100.00	100.00
15-16	96.32	94.10	92.35	93.62	94.06	98.29	95.79	85.17	91.14	100.00	100.00	100.00
16-17	96.95	96.07	93.94	95.36	95.55	98.41	95.46	88.47	92.83	100.00	100.00	100.00
17-18	97.37	96.79	95.33	96.62	96.51	98.54	95.86	90.30	94.15	100.00	100.00	100.00
18-19	97.79	97.31	96.52	97.49	97.27	98.15	96.66	92.26	95.27	100.00	100.00	100.00
19-20	97.90	98.03	97.32	98.36	97.90	98.76	98.53	94.66	97.19	100.00	100.00	100.00
20-21	98.21	98.24	97.71	98.94	98.28	99.88	98.80	96.06	97.83	100.00	100.00	100.00
21-22	98.32	98.55	98.41	99.13	98.61	99.88	99.33	96.91	98.51	100.00	100.00	100.00
22-23	98.84	98.76	98.71	99.32	98.91	99.88	99.47	97.61	98.78	100.00	100.00	100.00
23-24	99.26	99.17	98.91	99.52	99.22	99.88	99.60	98.03	98.99	100.00	100.00	100.00
24-25	99.26	99.28	99.11	99.61	99.32	100.00	100.00	98.85	99.29	100.00	100.00	100.00
25-26	99.58	99.48	99.20	99.81	99.39	100.00	100.00	98.85	99.39	100.00	100.00	100.00
26-27	99.58	99.58	99.60	99.81	99.62	100.00	100.00	98.85	99.39	100.00	100.00	100.00
27-28	99.58	99.69	99.60	99.81	99.67	100.00	100.00	98.85	99.39	100.00	100.00	100.00
28-29	99.58	99.69	99.70	99.81	99.70	100.00	100.00	98.85	99.39	100.00	100.00	100.00
29-30	99.68	99.79	99.70	99.81	99.75	100.00	100.00	98.85	99.39	100.00	100.00	100.00
30-31	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
31-32	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
32-33	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
33-34	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
34-35	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
35-36	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
36-37	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
37-38	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
38-39	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
39-40	99.68	99.79	99.70	99.81	99.77	100.00	100.00	98.85	99.39	100.00	100.00	100.00
40-41	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
TOTAL	952	966	1006	1034	3958	820	749	711	676	2956	2956	2956

TABLE 10.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33		KSC PEAK WINDS MONTH OF OCT.										CROSSWINDS		TOTAL NUMBER OBS.				
MRS	1	10	4	CROSSWIND											ZERO CROSSWIND			
				***** CRITICAL LIMITS IN KNOTS *****														
				5	10	9	10	10	14	15	10	19	20	24	25	ABOVE		
					PERCENTAGES													
UU-02	33-16	27-84	14-88	8-26	4-30	1-16											10-19	1767
U3-05	39-11	26-26	13-75	8-04	4-19	4-45											8-21	1767
U6-08	35-60	28-75	13-47	9-62	4-75	4-96											6-85	1767
U9-11	20-66	35-03	19-69	12-51	6-90	1-64											3-57	1767
12-14	17-20	33-64	24-79	15-00	5-55	2-32											1-30	1767
15-17	16-98	39-16	23-15	11-21	5-66	1-58											2-26	1767
18-20	34-66	27-79	15-05	8-09	4-41	2-38											6-62	1767
21-23	31-86	26-83	13-87	9-79	5-09	2-04											10-53	1767
UU-23	28-68	30-69	17-33	10-41	5-11	1-59											6-19	14136

TABLE 10.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

KSC PEAK WINDS										TAILWINDS									
MONTH OF										OCT.									
RUNWAY 15										RUNWAY 33									
TAILWIND										TAILWIND									
CRITICAL LIMITS IN KNOTS										CRITICAL LIMITS IN KNOTS									
1 10 4 5 TO 9 10 ABOVE										1 TO 4 5 TO 9 10 ABOVE									
PERCENTAGES										PERCENTAGES									
MRS																			
00-02	25-07	15-00	10-13							25-75	18-09	7-30							
03-05	48-41	19-75	10-30							21-82	12-34	5-72							
06-08	27-22	21-96	13-24							18-11	11-43	6-00							
09-11	14-15	18-73	25-92							14-20	15-34	10-53							
12-14	14-26	15-00	48-18							14-15	14-26	13-64							
15-17	14-37	17-60	24-11							18-96	13-36	11-07							
18-20	21-17	15-68	14-88							44-79	15-28	6-90							
21-23	21-45	14-26	12-11							27-28	15-34	7-64							
00-23	20-76	17-25	17-36							20-56	13-93	8-60							

RUNWAY 33										
TAILWIND										
***** CRITICAL LIMITS IN KNOTS *****										
1	10	4	5	10	9	10	10	14	15	ABOVE
PERCENTAGES										
25-75	14-09	7-30								
21-22	12-34	5-72								
18-11	11-43	6-00								
14-20	15-34	10-53								
14-15	14-26	13-64								
18-96	13-36	11-04								
24-79	15-28	6-90								
27-28	15-34	7-64								
20-56	13-93	8-60								

TABLE 10.3. (Continued)

KSC 1 AM WINDS		TAILWINDS VS CROSSWINDS													
MONTH OF OCT.		MONTH OF OCT.													
HOUR 6		NUMBER OBS. 589													
		RUNWAY 33													
		IND LIMITS ***													
		PERCENTAGES													
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP													
		ZERO CROSS													
		TOTAL													
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP													
		ZERO CROSS													
		TOTAL													
1 TO 4	17.49	5.09	3.06	2.21	.85	.17	1.70	30.56	6.96	5.26	1.70	1.19	1.70	.34	.85
5 TO 9	9.00	6.11	1.53	1.36	1.02	.17	2.21	21.39	1.36	3.74	2.39	2.21	.17	.00	1.02
10- UP	2.72	4.58	1.70	.85	.68	.34	.17	11.04	1.36	1.70	1.53	.68	.00	.17	.00
TOTAL	29.20	15.79	6.28	4.41	2.55	.68	4.07	62.99	9.68	10.70	5.60	4.07	1.87	.51	1.87
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS													
MONTH OF OCT.		MONTH OF OCT.													
HOUR 7		NUMBER OBS. 589													
		RUNWAY 33													
		CROSSWIND LIMITS ***													
		PERCENTAGES													
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP													
		ZERO CROSS													
		TOTAL													
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP													
		ZERO CROSS													
		TOTAL													
1 TO 4	16.47	5.94	2.38	1.70	.68	.51	1.70	29.37	7.30	5.43	2.04	2.38	1.19	.17	.65
5 TO 9	8.83	5.09	2.72	.85	1.36	.17	1.36	20.37	2.21	3.40	2.21	2.38	1.02	.00	.17
10- UP	3.57	4.75	2.21	1.70	.17	.00	.00	12.39	1.19	1.70	1.02	1.02	.00	.00	.00
TOTAL	28.86	15.79	7.30	4.24	2.21	.68	3.06	62.14	10.70	10.53	5.26	5.77	2.21	.17	1.02
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS													
MONTH OF OCT.		MONTH OF OCT.													
HOUR 8		NUMBER OBS. 589													
		RUNWAY 33													
		CROSSWIND LIMITS ***													
		PERCENTAGES													
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP													
		ZERO CROSS													
		TOTAL													
		1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP													
		ZERO CROSS													
		TOTAL													
1 TO 4	7.13	5.77	3.23	3.74	.85	.17	.85	21.73	4.07	6.28	2.38	2.55	1.36	.17	.17
5 TO 9	7.61	7.30	2.89	1.19	2.21	.17	2.55	24.11	2.04	4.58	2.89	1.19	.68	.17	.51
10- UP	5.69	6.62	3.06	.85	.34	.00	.34	16.30	2.21	2.89	1.53	.85	.00	.17	.00
TOTAL	20.43	19.69	9.17	5.77	3.40	.34	3.74	62.14	8.32	13.75	6.79	4.58	2.04	.51	.68

TABLE 10.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF OCT.		NUMBER OBS. 589		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		ZERO CROSS		TOTAL	
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	.34	3.90	3.90	3.74	.68	.34	.00	12.90	.51	4.58	3.74	3.40	1.53	.68	.00	14.43			
5 TO 9	2.04	4.75	3.40	3.23	1.36	.34	.17	15.28	1.87	5.09	3.74	2.55	.85	.68	.51	15.28			
10- UP	9.68	10.70	4.75	1.53	1.19	.17	.17	28.18	5.09	4.41	2.38	.51	.51	.00	.17	13.07			
TOTAL	12.05	19.35	12.05	8.49	3.23	.85	.34	56.37	7.47	14.09	9.85	6.45	2.89	1.36	.68	42.78			
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF OCT.		NUMBER OBS. 589		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		ZERO CROSS		TOTAL	
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	.34	4.92	4.92	4.75	.34	.68	.00	15.96	.00	4.41	3.74	3.57	1.19	.68	.00	13.58			
5 TO 9	1.67	4.41	3.57	2.04	1.02	.85	.00	13.75	1.87	3.06	4.41	1.53	1.36	.00	.51	12.73			
10- UP	9.60	10.19	6.62	1.70	1.02	.51	.17	29.20	5.26	4.58	2.72	1.19	.34	.00	.34	14.43			
TOTAL	11.21	19.52	15.11	8.49	2.38	2.04	.17	58.91	7.13	12.05	10.87	6.28	2.89	.68	.85	40.75			
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF OCT.		NUMBER OBS. 589		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		ZERO CROSS		TOTAL	
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL			
1 TO 4	.17	2.38	4.92	4.75	1.02	.51	.17	13.92	.00	5.26	3.90	4.24	.51	.51	.00	14.43			
5 TO 9	1.19	5.26	4.75	2.38	1.53	.85	.00	15.96	1.36	6.28	4.75	1.70	.51	.17	.00	18.77			
10- UP	6.45	12.73	4.92	1.70	1.19	.00	.17	27.16	4.58	4.58	3.23	.51	.51	.00	.00	13.41			
TOTAL	7.81	20.37	14.60	8.83	3.74	1.36	.34	57.05	5.94	16.13	11.88	6.45	1.53	.68	.00	42.61			

TABLE 10.3. (Concluded)

[illegible]

TABLE 10.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END

MKS PEAK WINDS		HEAD/TAIL WIND REVERSALS		MONTH OF		OCT.		*** RUNWAY 15 ***		*** RUNWAY 33 ***		10.4A	
HMS		PERCENTAGE		GIVEN A		PERCENTAGE		GIVEN A		PERCENTAGE		GIVEN A	
		REVERSALS		HEAD WIND		REVERSALS		HEAD WIND		REVERSALS		HEAD WIND	
		TOTAL		TAIL		TOTAL		TAIL		TOTAL		TAIL	
		9.92	6.52	3.40	13.37	6.79	10.66	3.63	7.03	6.87	19.89	7.10	16.43
00-02		10.66	6.46	4.20	15.53	7.10	10.77	4.31	6.46	7.10	16.43	7.10	16.43
03-05		11.00	5.22	5.78	13.86	9.27	10.66	5.95	4.71	9.24	13.22	9.24	13.22
06-08		12.41	5.39	7.03	13.07	11.96	12.24	6.92	5.33	11.55	13.28	11.55	13.28
09-11		14.34	7.03	7.31	16.49	12.75	14.34	7.37	6.97	12.73	16.55	12.73	16.55
12-14		10.37	4.88	5.50	11.08	7.82	10.49	5.44	5.05	9.62	11.62	9.62	11.62
15-17		10.77	4.65	6.12	9.61	11.86	10.49	5.90	4.59	11.13	9.76	11.13	9.76
18-20		10.71	4.99	5.73	9.54	12.00	10.66	5.61	5.05	11.30	10.02	11.30	10.02
21-23		11.27	5.64	5.63	12.62	10.19	11.29	5.64	5.65	9.92	13.09	9.92	13.09

MKS PEAK WINDS
HEADWIND TO TAILWIND REVERSALS
MONTH OF OCT.

*** RUNWAY 15 ***		*** RUNWAY 33 ***		10.4B	
HMS		GIVEN A HEADWIND		GIVEN A HEADWIND	
		RESULTANT TAILWIND MAGNITUDE		RESULTANT TAILWIND MAGNITUDE	
		> 0 - 3		> 0 - 3	
		4 - 8		4 - 8	
00-02		11.02	1.76	5.16	1.50
03-05		11.85	3.00	6.07	1.50
06-08		9.64	1.20	7.22	1.50
09-11		8.25	3.03	7.48	1.41
12-14		10.24	3.99	7.05	1.41
15-17		8.12	2.06	7.72	1.30
18-20		7.85	1.29	8.99	1.93
21-23		7.70	1.63	9.13	1.83
00-23		9.29	2.39	7.32	1.97

TABLE 11.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY 15 - 33		KSC PEAK WINDS		CROSSWINDS		TOTAL NUMBER OBS.	
		MONTH OF		MONTH OF			
		NOV.		NOV.			
HRS	1 TO 4	CROSSWIND				ZERO CROSSWIND	
		CRITICAL LIMITS IN KNOTS *****					
		5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	
		PERCENTAGES					
00-02	36.64	31.29	12.28	5.73	1.29	.06	12.51
03-05	40.88	31.58	10.64	4.09	.94	.12	11.75
06-08	42.26	28.71	9.88	5.09	.99	.23	1710
09-11	27.74	35.05	19.49	9.89	1.29	.35	1710
12-14	22.69	36.14	21.58	11.93	2.11	.70	1709
15-17	29.53	36.07	17.49	7.37	1.35	.53	1710
18-20	44.68	22.28	10.64	5.73	1.40	.06	1710
21-23	36.77	27.54	12.51	6.14	1.52	.06	1710
00-02	35.43	31.33	14.31	7.00	1.36	.26	13679

TABLE 11.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

KSC PEAK WINDS				TAILWINDS			
MONTH OF				NOV.			
RUNWAY 15				RUNWAY 33			
TAILWIND				TAILWIND			
CRITICAL LIMITS IN KNOTS				CRITICAL LIMITS IN KNOTS			
1 TO 4 5 TO 9 10 ABOVE				1 TO 4 5 TO 9 10 ABOVE			
PERCENTAGES				PERCENTAGES			
HRS	TOTAL			TOTAL	TOTAL		
	NUMBER	OBS.	NUMBER		OBS.		
00-02	21.75	16.73	15.85	1710	19.00	14.50	6.20
03-05	22.46	19.12	19.01	1710	20.29	10.53	4.21
06-08	22.28	21.05	21.35	1710	17.43	9.59	3.63
09-11	11.94	14.45	31.48	1709	15.16	12.93	10.71
12-14	11.17	12.98	32.51	1710	12.98	13.45	13.90
15-17	15.32	16.32	25.91	1710	15.96	14.91	8.71
18-20	24.21	15.26	15.26	1710	24.62	12.11	4.50
21-23	21.23	15.44	15.67	1710	23.51	14.04	5.67
00-23	18.80	16.42	22.13	13679	18.73	12.76	7.20

RUNWAY 33	
TAILWIND	
CRITICAL LIMITS IN KNOTS	
1 TO 4	5 TO 9
PERCENTAGES	10 ABOVE
19.88	14.50
20.29	10.53
17.43	9.59
15.16	12.93
12.98	13.45
15.96	14.91
24.62	12.11
23.51	14.04
18.73	12.76
6.20	4.21
3.63	10.71
13.98	8.71
8.50	5.67
7.20	

TABLE 11.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF NOV.										MONTH OF NOV.									
HOUR 0										NUMBER OBS. 570									
TAILWIND LIMITS										RUNWAY 33									
1 TO 4										*** CROSSWIND LIMITS ***									
5 TO 9										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 PERCENTAGES									
10- UP										25- UP									
TOTAL										ZERO CROSS									
1 TO 4	5.61	1.75	1.75	.18	.00	3.16	21.58	9.47	6.10	1.75	1.05	.00	.00	.00	.70	19.12			
5 TO 9	5.44	1.93	.70	.18	.00	2.11	15.96	4.56	5.09	2.28	1.58	.18	.00	.00	1.75	15.00			
10- UP	5.46	6.32	2.98	.72	.00	5.26	15.44	1.93	2.63	1.75	.53	.18	.00	.00	.18	7.19			
TOTAL	17.52	17.54	6.67	3.16	.53	52.98	53.33	15.96	13.86	5.79	3.16	.35	.00	.00	2.63	41.75			
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF NOV.										MONTH OF NOV.									
HOUR 1										NUMBER OBS. 570									
TAILWIND LIMITS										RUNWAY 33									
1 TO 4										*** CROSSWIND LIMITS ***									
5 TO 9										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 PERCENTAGES									
10- UP										25- UP									
TOTAL										ZERO CROSS									
1 TO 4	5.44	1.58	1.05	.53	.18	2.28	20.53	8.42	7.54	1.93	1.93	.18	.00	.00	1.23	21.23			
5 TO 9	6.49	5.26	1.75	.35	.00	2.63	16.67	4.56	4.39	3.51	.88	.00	.00	.00	1.23	14.56			
10- UP	5.44	7.19	2.46	.88	.00	4.91	16.14	1.58	1.75	1.58	.35	.53	.00	.00	.18	5.92			
TOTAL	21.40	17.89	5.79	2.11	1.05	53.33	53.33	14.56	13.68	7.02	3.16	.70	.00	.00	2.63	41.75			
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF NOV.										MONTH OF NOV.									
HOUR 2										NUMBER OBS. 570									
TAILWIND LIMITS										RUNWAY 33									
1 TO 4										*** CROSSWIND LIMITS ***									
5 TO 9										1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 PERCENTAGES									
10- UP										25- UP									
TOTAL										ZERO CROSS									
1 TO 4	10.53	7.72	.88	.53	.00	1.75	23.16	8.95	6.67	1.75	1.23	.00	.00	.00	.70	19.30			
5 TO 9	7.89	3.86	2.46	.53	.00	2.63	17.54	2.98	5.26	2.98	.70	.18	.00	.00	1.40	13.51			
10- UP	6.84	6.14	2.20	.53	.00	4.39	15.96	1.58	1.23	1.23	.88	.18	.00	.00	.35	5.84			
TOTAL	25.26	17.72	5.61	2.81	.88	56.67	56.67	13.51	13.16	5.96	2.81	.35	.00	.00	2.46	38.25			

TABLE 11.3. (Continued)

MSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF NOV.					
HOUR 6		NUMBER OBS. 570															
		RUNWAY 33															
		*** CROSSWIND LIMITS ***															
		PERCENTAGES															
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4	12.63	5.61	.88	.53	.18	.00	3.86	23.60	8.60	9.91	1.90	1.75	.00	.00	.00	.00	17.54
5 TO 9	12.41	3.86	1.58	1.23	.53	.18	2.63	22.81	2.98	3.16	1.93	.53	.00	.00	.00	.00	9.47
10- UP	6.32	8.95	2.28	1.05	.18	.00	.35	19.12	1.40	1.23	.18	.00	.00	.00	.00	.00	2.98
TOTAL	31.75	18.42	4.74	2.81	.88	.18	6.84	65.61	12.98	9.30	3.51	2.28	.18	.00	.00	1.75	30.00

MSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF NOV.					
HOUR 7		NUMBER OBS. 570															
		RUNWAY 33															
		*** CROSSWIND LIMITS ***															
		PERCENTAGES															
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4	14.91	4.74	1.40	1.05	.53	.00	2.11	24.74	8.25	9.91	2.11	1.05	.18	.18	.00	1.05	17.72
5 TO 9	11.40	4.56	.05	.18	.35	.00	3.68	21.23	2.81	4.39	1.75	.35	.18	.00	.00	.18	9.65
10- UP	7.37	8.25	2.46	1.23	.00	.00	.18	19.47	1.23	.53	.70	.00	.00	.00	.00	.18	2.63
TOTAL	33.68	17.54	4.91	2.46	.88	.00	5.96	65.44	12.28	9.82	4.56	1.40	.35	.18	.00	1.40	30.00

MSC PEAK WINDS		TAILWINDS VS CROSSWINDS										MONTH OF NOV.					
HOUR 8		NUMBER OBS. 570															
		RUNWAY 33															
		*** CROSSWIND LIMITS ***															
		PERCENTAGES															
TAILWIND LIMITS		1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL
1 TO 4	9.82	2.46	2.63	.70	.00	.00	2.81	18.42	4.91	6.32	2.46	2.11	.18	.18	.00	.00	17.02
5 TO 9	8.77	4.91	.53	1.05	.35	.00	3.51	19.12	2.28	4.56	1.40	.53	.18	.00	.00	.53	9.65
10- UP	4.60	10.53	4.21	1.40	.00	.00	.70	25.44	1.75	2.28	.70	.53	.00	.00	.00	.00	5.26
TOTAL	27.19	17.89	7.37	3.16	.35	.00	7.02	62.98	8.95	13.16	4.56	3.16	.35	.00	.00	1.40	31.95

TABLE 11.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF NOV.		NUMBER OBS.		570		RUNWAY 33		CROSSWIND LIMITS		PERCENTAGES		25- UP		ZERO CROSS		TOTAL		25- UP		ZERO CROSS		TOTAL	
HOUR 12		TAILWIND LIMITS		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP		ZERO CROSS		TOTAL		25- UP		ZERO CROSS		TOTAL			
1 TO 4	.53	5.26	3.51	1.75	.18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	2.11	5.61	2.11	1.40	.88	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53
10- UP	12.28	12.98	4.91	1.93	.18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	14.91	23.86	10.53	5.09	1.23	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53
HOUR 13		TAILWIND LIMITS		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP		ZERO CROSS		TOTAL		25- UP		ZERO CROSS		TOTAL			
1 TO 4	.70	3.68	2.63	2.98	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	1.23	5.79	2.63	1.93	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	
10- UP	11.40	14.74	4.74	1.75	.70	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	
TOTAL	13.33	24.21	10.00	6.67	1.05	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	.53	
HOUR 14		TAILWIND LIMITS		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP		ZERO CROSS		TOTAL		25- UP		ZERO CROSS		TOTAL			
1 TO 4	.00	4.39	4.74	7.63	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	
5 TO 9	1.23	6.67	2.46	1.93	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	
10- UP	11.93	11.93	5.79	1.40	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	
TOTAL	13.16	22.98	12.98	5.96	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	

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TABLE 11.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY CLASS (KNOTS)	HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF NOV.											
	KSC PEAK WINDS				*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF
0-1	21.19	14.58	10.93	12.67	14.55	11.05	7.36	6.58	9.87	8.80	8.80	8.80
1-2	32.62	24.31	21.32	21.07	24.47	17.54	13.00	11.97	16.65	14.89	14.89	14.89
2-3	43.38	31.11	24.70	27.96	31.24	23.86	16.54	15.60	19.65	19.09	19.09	19.09
3-4	52.48	37.78	30.09	36.23	38.52	30.78	20.46	19.33	28.09	24.02	24.02	24.02
4-5	62.58	43.89	36.71	44.35	46.15	36.87	24.95	23.65	30.11	29.74	29.74	29.74
5-6	69.54	52.22	42.51	53.72	53.78	48.48	29.25	28.26	35.91	35.95	35.95	35.95
6-7	75.50	56.81	48.31	59.37	59.26	53.96	33.37	31.01	39.88	40.08	40.08	40.08
7-8	79.14	61.11	52.50	65.84	63.96	58.52	37.09	34.84	45.50	44.51	44.51	44.51
8-9	83.44	68.19	59.38	72.31	70.23	62.73	41.40	39.55	50.34	49.02	49.02	49.02
9-10	89.74	74.58	67.75	79.48	77.32	69.22	48.57	45.44	57.12	55.60	55.60	55.60
10-11	91.23	77.92	71.79	82.37	80.33	73.19	52.77	49.56	61.96	59.87	59.87	59.87
11-12	93.87	80.28	77.46	87.33	84.31	76.48	58.22	55.05	65.92	64.38	64.38	64.38
12-13	95.86	84.03	82.46	90.63	87.89	80.10	62.52	59.27	70.57	68.56	68.56	68.56
13-14	97.35	89.03	87.04	94.08	91.62	83.47	68.26	64.87	74.73	73.23	73.23	73.23
14-15	98.18	92.08	89.88	95.45	93.69	86.09	72.37	69.48	77.73	76.77	76.77	76.77
15-16	98.84	94.17	92.85	97.25	95.63	88.45	76.20	73.31	80.25	79.88	79.88	79.88
16-17	99.01	96.25	95.68	98.48	97.28	90.47	81.36	76.94	83.25	83.29	83.29	83.29
17-18	99.34	97.22	97.03	99.04	98.10	92.16	83.65	81.06	86.64	86.11	86.11	86.11
18-19	99.50	97.92	98.25	99.31	98.71	94.10	87.00	83.91	88.19	88.52	88.52	88.52
19-20	99.67	98.61	99.19	99.31	99.18	95.28	89.77	87.63	90.71	91.01	91.01	91.01
20-21	99.83	99.03	99.33	99.45	99.39	96.04	91.40	89.40	92.26	92.41	92.41	92.41
21-22	99.83	99.72	99.73	99.45	99.68	97.47	94.26	92.74	94.58	94.86	94.86	94.86
22-23	99.72	99.72	99.73	99.59	99.82	98.15	95.41	94.01	95.84	95.94	95.94	95.94
23-24	100.00	100.00	99.73	99.59	99.82	98.65	96.75	95.68	96.90	97.06	97.06	97.06
24-25	*****	*****	99.73	99.59	99.82	99.07	97.80	96.57	97.58	97.81	97.81	97.81
25-26	*****	*****	99.73	99.72	99.86	99.41	98.28	97.55	98.45	98.46	98.46	98.46
26-27	*****	*****	99.87	95.72	99.89	99.66	98.37	98.23	98.74	98.79	98.79	98.79
27-28	*****	*****	100.00	99.72	99.93	99.83	98.85	98.63	99.23	99.16	99.16	99.16
28-29	*****	*****	*****	99.72	99.93	99.92	99.24	99.41	99.61	99.56	99.56	99.56
29-30	*****	*****	*****	99.72	99.93	100.00	99.90	100.00	99.81	99.79	99.79	99.79
30-31	*****	*****	*****	99.86	99.96	*****	100.00	*****	99.90	99.93	99.93	99.93
31-32	*****	*****	*****	99.86	99.96	*****	*****	*****	99.90	99.98	99.98	99.98
32-33	*****	*****	*****	99.86	99.96	*****	*****	*****	99.90	99.98	99.98	99.98
33-34	*****	*****	*****	99.86	99.96	*****	*****	*****	99.90	99.98	99.98	99.98
34-35	*****	*****	*****	99.86	99.96	*****	*****	*****	99.90	99.98	99.98	99.98
35-36	*****	*****	*****	99.86	99.96	*****	*****	*****	99.90	99.98	99.98	99.98
36-37	*****	*****	*****	99.86	99.96	*****	*****	*****	99.90	99.98	99.98	99.98
37-38	*****	*****	*****	99.86	99.96	*****	*****	*****	100.00	100.00	100.00	100.00
38-39	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
39-40	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
40-41	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
41-42	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
42-43	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
43-44	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
44-45	*****	*****	*****	99.86	99.96	*****	*****	*****	*****	*****	*****	*****
45-46	*****	*****	*****	100.00	100.00	*****	*****	*****	*****	*****	*****	*****
NOBS	604	720	741	726	2791	1186	1086	1019	1033	4264	4264	4264

TABLE 12.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

RUNWAY	15 - 33	KSC PEAK WINDS															TOTAL NUMBER OBS.			
		MONTH OF DEC.																		
		CROSSWINDS																		
		***** CRITICAL LIMITS IN KNOTS *****																		
MRS	1	TO 4	5	TO 9	PERCENTAGES										20	24	25	ABOVE	ZERO CROSSWIND	
					10	TO 14	15	TO 19	20	24	25	ABOVE								
CU-02		41.78	29.08		10.88	4.71		1.19										11.45	1764	
U3-U5		44.67	27.78		9.58	4.54		.79										12.36	1764	
U6-U8		43.76	28.57		10.77	3.68		.79										11.96	1764	
U9-11		32.94	33.79		18.31	7.03		1.42										5.67	1764	
12-14		32.77	33.45		18.88	8.45		1.81										3.80	1764	
15-17		37.70	34.18		14.51	5.50		1.19										6.35	1764	
18-20		47.90	21.43		9.75	3.97		1.13										15.36	1764	
21-23		44.16	25.11		12.02	4.08		1.13										12.53	1764	
UU-23		40.71	29.17		13.09	5.24		1.18										9.98	14112	

TABLE 12.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

HPS	KSC PEAK WINDS										TAILWINDS									
	MONTH OF DEC.																			
	RUNWAY 15										RUNWAY 33									
	TAILWIND										TAILWIND									
	CRITICAL LIMITS IN KNOTS										CRITICAL LIMITS IN KNOTS									
1 TO 4										1 TO 4										
5 TO 9										5 TO 9										
PERCENTAGES										PERCENTAGES										
TOTAL										TOTAL										
NUMBER										NUMBER										
OBS.										OBS.										
CU-02	20.35	20.29	16.61							1764	16.61	12.41	10.37			9.47				
U3-05	20.41	21.15	18.93							1764	16.84	10.37				8.16				
U6-U8	21.71	21.32	20.69							1764	14.96	10.20				8.62				
U9-11	10.71	14.85	33.05							1764	10.54	11.96				17.35				
12-14	8.73	12.36	34.98							1764	9.47	10.43				22.56				
15-17	11.96	16.21	28.34							1764	11.68	12.02				18.48				
18-20	21.03	19.22	15.31							1764	16.44	13.83				10.77				
21-23	21.43	18.48	14.34							1764	17.74	14.00				10.54				
UU-23	17.04	17.98	22.78							14112	14.22	11.90				13.24				

TABLE 12.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

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KSC PEAK WINDS										TAILWINDS VS CROSSWINDS																
MONTH OF DEC.										MONTH OF DEC.																
HOUR 0										HOUR 1																
NUMBER OBS. 588										NUMBER OBS. 588																
RUNWAY 15										RUNWAY 33																
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***																
PERCENTAGES										PERCENTAGES																
TAILWIND LIMITS	1	10	4	5	10	14	15	19	20	24	25- UP	ZERO CROSS	TOTAL *	1	10	4	5	10	14	15	19	20	24	25- UP	ZERO CROSS	TOTAL
1 TO 4	11.05	4.76	.85	1.19	.34	.34	2.55	21.09	8.16	5.27	1.19	1.02	.00	.17	2.21	11.90	2.21	11.90	2.21	11.90	2.21	11.90	2.21	11.90	2.21	11.90
5 TO 9	10.54	5.10	1.02	.68	.51	.17	1.87	19.90	4.76	1.87	2.38	.34	.17	.17	2.21	11.90	.34	11.90	.34	11.90	.34	11.90	.34	11.90	.34	11.90
10- UP	4.42	7.82	2.55	.85	.00	.00	.00	15.65	3.40	3.57	2.21	1.02	.00	.00	.00	10.20	.00	10.20	.00	10.20	.00	10.20	.00	10.20	.00	10.20
TOTAL	26.02	17.69	4.42	2.72	.85	.51	4.42	56.63	16.33	10.71	5.78	2.38	.17	.34	3.40	39.12	.17	39.12	.17	39.12	.17	39.12	.17	39.12	.17	39.12
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS																
MONTH OF DEC.										MONTH OF DEC.																
HOUR 1										HOUR 2																
NUMBER OBS. 588										NUMBER OBS. 588																
RUNWAY 15										RUNWAY 33																
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***																
PERCENTAGES										PERCENTAGES																
TAILWIND LIMITS	1	10	4	5	10	14	15	19	20	24	25- UP	ZERO CROSS	TOTAL *	1	10	4	5	10	14	15	19	20	24	25- UP	ZERO CROSS	TOTAL
1 TO 4	13.54	5.10	1.53	.51	.17	.17	1.87	19.90	7.14	5.10	1.36	.51	.34	.00	1.36	15.82	.00	15.82	.00	15.82	.00	15.82	.00	15.82	.00	15.82
5 TO 9	8.67	5.78	1.36	1.02	.51	.17	3.06	20.58	4.08	4.42	1.87	1.36	.00	.17	1.53	13.44	.17	13.44	.17	13.44	.17	13.44	.17	13.44	.17	13.44
10- UP	5.95	7.14	2.55	.51	.34	.00	.00	16.50	3.74	2.72	2.04	.85	.00	.00	.00	9.52	.00	9.52	.00	9.52	.00	9.52	.00	9.52	.00	9.52
TOTAL	25.17	18.03	5.44	2.04	1.02	.34	4.93	56.97	14.97	12.24	5.27	2.72	.34	.17	3.06	38.78	.17	38.78	.17	38.78	.17	38.78	.17	38.78	.17	38.78
KSC PEAK WINDS										TAILWINDS VS CROSSWINDS																
MONTH OF DEC.										MONTH OF DEC.																
HOUR 2										HOUR 3																
NUMBER OBS. 588										NUMBER OBS. 588																
RUNWAY 15										RUNWAY 33																
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***																
PERCENTAGES										PERCENTAGES																
TAILWIND LIMITS	1	10	4	5	10	14	15	19	20	24	25- UP	ZERO CROSS	TOTAL *	1	10	4	5	10	14	15	19	20	24	25- UP	ZERO CROSS	TOTAL
1 TO 4	11.05	4.25	1.53	.66	.17	.17	2.21	20.07	8.84	4.42	1.70	.34	.51	.00	1.19	17.01	.00	17.01	.00	17.01	.00	17.01	.00	17.01	.00	17.01
5 TO 9	10.03	5.10	1.53	.68	.34	.00	2.72	20.41	3.57	4.59	2.04	1.02	.17	.20	.51	11.90	.20	11.90	.20	11.90	.20	11.90	.20	11.90	.20	11.90
10- UP	5.95	7.82	2.69	.85	.00	.00	.17	17.69	3.40	2.38	2.04	.68	.00	.00	.17	8.67	.00	8.67	.00	8.67	.00	8.67	.00	8.67	.00	8.67
TOTAL	27.04	17.18	5.95	2.21	.51	.17	5.10	58.16	15.82	11.39	5.78	2.04	.68	.00	1.87	37.59	.00	37.59	.00	37.59	.00	37.59	.00	37.59	.00	37.59

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TABLE 12.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF DEC.									
HOUR 3		NUMBER OBS. 500									
				RUNWAY 15		*** CROSSWIND LIMITS ***		RUNWAY 33		*** CROSSWIND LIMITS ***	
TAILWIND LIMITS		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24	
1 TO 4		1 TO 4		5 TO 9		10 TO 14		15 TO 19		25- UP	
5 TO 9		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP	
10- UP		10- UP		10- UP		10- UP		10- UP		10- UP	
TOTAL		TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
1 TO 4	11.56	5.78	1.02	.51	.34	.17	1.87	21.26	* 9.52	3.40	.85
5 TO 9	10.68	4.25	1.19	.68	.00	.17	3.06	20.24	* 2.38	3.74	.85
10- UP	6.46	7.48	3.40	.85	.00	.34	18.54	* 3.91	1.87	1.36	.00
TOTAL	28.91	17.52	5.61	2.04	.34	.34	5.27	60.03	* 15.82	9.01	2.72
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF DEC.									
HOUR 4		NUMBER OBS. 500									
				RUNWAY 15		*** CROSSWIND LIMITS ***		RUNWAY 33		*** CROSSWIND LIMITS ***	
TAILWIND LIMITS		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24	
1 TO 4		1 TO 4		5 TO 9		10 TO 14		15 TO 19		25- UP	
5 TO 9		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP	
10- UP		10- UP		10- UP		10- UP		10- UP		10- UP	
TOTAL		TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
1 TO 4	9.69	5.95	.51	.34	.17	1.53	18.37	* 8.84	4.59	1.36	.85
5 TO 9	13.10	4.08	1.36	.68	.17	.00	2.72	22.11	* 3.91	2.55	.51
10- UP	5.95	9.01	2.72	.68	.00	.17	18.54	* 2.89	2.38	1.53	.85
TOTAL	28.74	19.05	4.59	1.70	.34	.17	4.42	59.01	* 15.65	9.52	2.89
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS									
		MONTH OF DEC.									
HOUR 5		NUMBER OBS. 500									
				RUNWAY 15		*** CROSSWIND LIMITS ***		RUNWAY 33		*** CROSSWIND LIMITS ***	
TAILWIND LIMITS		1 TO 4		5 TO 9		10 TO 14		15 TO 19		20 TO 24	
1 TO 4		1 TO 4		5 TO 9		10 TO 14		15 TO 19		25- UP	
5 TO 9		5 TO 9		10 TO 14		15 TO 19		20 TO 24		25- UP	
10- UP		10- UP		10- UP		10- UP		10- UP		10- UP	
TOTAL		TOTAL		TOTAL		TOTAL		TOTAL		TOTAL	
1 TO 4	12.41	5.27	.17	.53	.34	.00	1.87	21.60	* 8.84	4.25	1.19
5 TO 9	11.56	4.59	1.02	.34	.00	.17	3.40	21.09	* 3.06	2.38	.85
10- UP	6.29	8.84	3.74	.51	.00	.34	19.73	* 2.72	2.89	1.36	.00
TOTAL	30.27	18.71	4.93	2.38	.34	.17	5.61	62.41	* 14.63	9.52	1.87

TABLE 12.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS. 500		RUNWAY 15		RUNWAY 33		ZERO CROSS		ZERO CROSS		TOTAL					
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1 TO 4	15.61	4.08	1.02	1.02	.17	.00	.17	22.79	8.33	4.25	1.02	.34	.17	.00	.51	1.02	1.02	.34	.17	.00	19.63
5 TO 9	10.54	3.74	.85	1.02	.17	.17	.17	20.75	3.57	3.06	1.53	.51	.00	.00	1.02	1.02	1.53	.51	.00	.00	9.69
10- UP	5.95	9.52	4.08	.34	.17	.34	.17	20.41	3.57	3.06	1.36	.34	.17	.00	.17	1.02	1.36	.34	.17	.00	8.67
TOTAL	30.10	17.35	5.95	2.38	.51	.34	.51	63.95	15.48	10.37	3.91	1.19	.34	.00	1.70	1.70	3.91	1.19	.34	.00	32.99
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS. 500		RUNWAY 15		RUNWAY 33		ZERO CROSS		ZERO CROSS		TOTAL					
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1 TO 4	13.10	4.76	1.02	.85	.00	.00	.00	23.13	7.65	4.42	1.19	.34	.00	.17	.85	1.19	1.19	.34	.00	.17	14.63
5 TO 9	11.56	3.91	1.53	.68	.17	.34	.17	21.60	3.40	2.38	2.38	.51	.17	.00	1.70	1.70	2.38	.51	.17	.00	10.54
10- UP	5.10	10.54	2.55	.51	.17	.00	.17	19.05	2.38	2.72	2.38	.34	.00	.00	.00	1.70	2.72	.34	.00	.00	7.99
TOTAL	29.76	19.22	5.10	2.04	.34	.34	.34	63.78	13.44	9.52	5.95	1.19	.17	.34	2.55	2.55	5.95	1.19	.17	.34	33.16
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS. 500		RUNWAY 15		RUNWAY 33		ZERO CROSS		ZERO CROSS		TOTAL					
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1 TO 4	11.22	5.91	.68	.51	.00	.17	.00	19.22	6.63	4.25	2.21	.68	.00	.00	.34	1.02	1.02	.68	.00	.00	14.12
5 TO 9	11.59	3.91	1.19	1.36	.00	.00	.00	21.60	3.06	3.40	1.19	.68	.34	.17	1.53	1.53	1.19	.68	.34	.17	10.37
10- UP	7.31	10.03	3.91	.85	.51	.00	.51	22.62	2.89	3.74	2.21	.17	.00	.00	.00	1.70	3.74	.17	.17	.00	9.18
TOTAL	29.93	17.86	5.78	2.72	.51	.17	.51	63.44	12.59	11.39	5.61	1.53	.51	.17	1.87	1.87	5.61	1.53	.51	.17	33.67

TABLE 12.3. (Continued)

MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF DEC.										MONTH OF DEC.									
HOUR 9										NUMBER OBS. 500									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	5.01	3.57	1.19	1.19	.17	.17	2.21	14.12	2.21	5.10	3.57	.85	.00	.17	.00	11.90			
5 TO 9	9.01	2.89	1.36	.51	.17	.00	3.06	17.01	2.72	3.74	2.38	.85	.34	.17	1.53	11.73			
10- UP	11.05	13.10	4.08	.51	.34	.34	.00	29.42	3.91	6.29	3.23	.34	.00	.17	.34	14.29			
TOTAL	25.08	14.56	6.63	2.21	.68	.51	5.27	60.54	8.64	15.14	9.18	2.04	.34	.51	1.87	37.93			

MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF DEC.										MONTH OF DEC.									
HOUR 10										NUMBER OBS. 500									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	1.70	3.74	1.53	2.36	.00	.00	.51	9.86	1.36	4.08	2.72	1.70	.17	.17	.00	10.20			
5 TO 9	7.99	2.04	2.55	1.02	.00	.00	2.04	15.65	2.04	3.57	3.74	1.02	.51	.00	.51	11.39			
10- UP	14.29	12.93	3.23	1.53	.51	.34	.17	32.99	6.63	6.97	3.23	1.02	.00	.34	.17	18.37			
TOTAL	23.98	18.71	7.31	4.93	.51	.34	2.72	58.50	10.03	14.63	5.69	3.74	.68	.51	.68	39.97			

MSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF DEC.										MONTH OF DEC.									
HOUR 11										NUMBER OBS. 500									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP										1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP									
PERCENTAGES										PERCENTAGES									
1 TO 4	.51	3.06	2.21	2.04	.17	.17	.00	8.16	.65	3.91	2.55	1.87	.34	.00	.00	9.52			
5 TO 9	3.40	4.42	2.72	.17	.17	.34	.68	11.90	1.70	4.42	4.25	1.70	.51	.00	.17	12.76			
10- UP	15.65	11.90	6.29	1.53	.51	.00	.85	36.73	8.16	5.61	4.08	.85	.34	.17	.17	19.39			
TOTAL	19.56	19.39	11.22	3.74	.85	.51	1.53	56.80	10.71	13.95	10.89	4.42	1.19	.17	.34	41.67			

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KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF DEC.										MONTH OF DEC.									
HOUR 12										HOUR 13									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 14										HOUR 15									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 16										HOUR 17									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 18										HOUR 19									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 20										HOUR 21									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 22										HOUR 23									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 24										HOUR 25									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 26										HOUR 27									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 28										HOUR 29									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 30										HOUR 31									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 32										HOUR 33									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 34										HOUR 35									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 36										HOUR 37									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 38										HOUR 39									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 40										HOUR 41									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 42										HOUR 43									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 44										HOUR 45									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 46										HOUR 47									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 48										HOUR 49									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 50										HOUR 51									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 52										HOUR 53									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 54										HOUR 55									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 56										HOUR 57									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 58										HOUR 59									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 60										HOUR 61									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 62										HOUR 63									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 64										HOUR 65									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 66										HOUR 67									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 68										HOUR 69									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 70										HOUR 71									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 72										HOUR 73									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 74										HOUR 75									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 76										HOUR 77									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 78										HOUR 79									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 80										HOUR 81									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 82										HOUR 83									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 84										HOUR 85									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 86										HOUR 87									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 88										HOUR 89									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 90										HOUR 91									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 92										HOUR 93									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 94										HOUR 95									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 96										HOUR 97									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 98										HOUR 99									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 100										HOUR 101									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 102										HOUR 103									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 104										HOUR 105									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 106										HOUR 107									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 108										HOUR 109									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 110										HOUR 111									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 112										HOUR 113									
NUMBER OBS. 500										NUMBER OBS. 500									
HOUR 114																			

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TABLE 12.3. (Continued)

MSC PEAK WINDS													TAILWINDS VS CROSSWINDS												
MONTH OF DEC.													MONTH OF DEC.												
HOUR 15													HOUR 15												
NUMBER OBS. 500													NUMBER OBS. 500												
RUNWAY 15													RUNWAY 33												
*** CROSSWIND LIMITS ***													*** CROSSWIND LIMITS ***												
PERCENTAGES													PERCENTAGES												
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
.51	3.74	3.74	.85	.17	.34	.00	9.35	.34	3.74	2.89	1.87	.17	.17	.17	9.35	.34	3.74	2.89	1.87	.17	.17	.17	9.35		
3.57	6.97	2.21	.68	.68	.17	.68	14.97	2.55	3.74	2.21	.51	.00	.17	1.07	11.05	2.55	3.74	2.21	.51	.00	.17	1.07	11.05		
14.46	2.24	4.25	1.70	.17	.00	.17	32.99	10.37	5.44	3.91	.68	.17	.00	.51	21.09	10.37	5.44	3.91	.68	.17	.00	.51	21.09		
18.54	21.96	16.20	3.23	1.32	.51	.85	57.31	13.27	12.93	9.01	3.06	.34	.34	2.55	41.50	13.27	12.93	9.01	3.06	.34	.34	2.55	41.50		

MSC PEAK WINDS													TAILWINDS VS CROSSWINDS												
MONTH OF DEC.													MONTH OF DEC.												
HOUR 16													HOUR 16												
NUMBER OBS. 500													NUMBER OBS. 500												
RUNWAY 15													RUNWAY 33												
*** CROSSWIND LIMITS ***													*** CROSSWIND LIMITS ***												
PERCENTAGES													PERCENTAGES												
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
2.04	5.61	2.41	1.02	.00	.17	.00	11.05	1.36	4.93	4.72	1.19	.34	.00	.17	10.71	1.36	4.93	4.72	1.19	.34	.00	.17	10.71		
4.93	5.78	3.23	.51	.51	.17	1.70	16.84	2.89	3.91	2.04	.85	.00	.17	1.70	11.56	2.89	3.91	2.04	.85	.00	.17	1.70	11.56		
13.78	10.03	3.23	1.15	.17	.00	.17	28.57	9.52	6.46	2.21	.51	.00	.00	1.36	20.07	9.52	6.46	2.21	.51	.00	.00	1.36	20.07		
20.75	21.43	8.67	2.72	.68	.34	1.87	56.46	13.78	15.31	6.97	2.55	.34	.17	3.23	42.35	13.78	15.31	6.97	2.55	.34	.17	3.23	42.35		

MSC PEAK WINDS													TAILWINDS VS CROSSWINDS												
MONTH OF DEC.													MONTH OF DEC.												
HOUR 17													HOUR 17												
NUMBER OBS. 500													NUMBER OBS. 500												
RUNWAY 15													RUNWAY 33												
*** CROSSWIND LIMITS ***													*** CROSSWIND LIMITS ***												
PERCENTAGES													PERCENTAGES												
1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	ZERO CROSS	TOTAL		
6.12	6.46	1.36	1.19	.00	.17	.17	15.48	7.48	5.27	.68	1.02	.17	.00	.34	14.97	7.48	5.27	.68	1.02	.17	.00	.34	14.97		
7.14	4.42	1.19	.85	.51	.00	2.72	16.84	4.59	4.42	1.36	.68	.17	.17	2.04	13.44	4.59	4.42	1.36	.68	.17	.17	2.04	13.44		
13.27	5.61	2.89	.68	.34	.00	.68	23.47	8.16	3.74	1.19	.51	.00	.00	.68	14.29	8.16	3.74	1.19	.51	.00	.00	.68	14.29		
26.53	16.50	5.44	2.72	.85	.17	3.57	55.78	20.24	13.44	3.23	2.21	.34	.17	3.06	42.69	20.24	13.44	3.23	2.21	.34	.17	3.06	42.69		

TABLE 12.3. (Continued)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS. 500		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		25- UP		ZERO CROSS		TOTAL		ZERO CROSS		TOTAL				
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP
1 TO 4	12.93	3.06	1.67	.17	.17	.00	.17	19.73	9.86	4.25	.85	1.02	.00	.17	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51
5 TO 9	8.67	3.06	2.38	.68	.17	.17	.17	19.22	4.93	4.08	1.02	.34	.00	.17	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51
10- UP	8.33	5.10	2.55	.34	.34	.00	.34	17.18	6.80	1.70	.85	.17	.34	.00	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34
TOTAL	29.93	11.22	6.60	1.19	.68	.17	.68	56.12	21.60	10.03	2.72	1.53	.34	.17	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS. 500		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		25- UP		ZERO CROSS		TOTAL		ZERO CROSS		TOTAL				
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP
1 TO 4	11.05	4.08	2.38	.51	.00	.00	.00	21.09	9.35	4.08	1.19	.68	.00	.17	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
5 TO 9	7.99	2.72	1.36	.68	.65	.00	.65	19.73	4.93	3.06	1.87	.68	.00	.17	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51
10- UP	6.12	4.59	1.87	1.36	.34	.17	.34	15.31	5.95	2.89	1.02	.34	.00	.17	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51
TOTAL	25.17	11.39	5.61	2.55	1.19	.17	1.19	56.12	20.24	10.03	4.08	1.70	.00	.34	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS. 500		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		25- UP		ZERO CROSS		TOTAL		ZERO CROSS		TOTAL				
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP
1 TO 4	12.07	4.08	2.89	.85	.00	.00	.00	22.28	9.35	3.57	1.36	1.02	.17	.17	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51
5 TO 9	7.02	3.57	1.19	1.19	.51	.00	.51	18.71	5.44	3.74	1.53	.51	.00	.17	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51	.51
10- UP	5.44	4.42	1.87	.85	.34	.17	.34	13.44	6.63	2.21	1.19	.51	.17	.00	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34
TOTAL	25.34	12.07	5.95	2.89	.85	.17	.85	54.42	21.43	9.52	4.08	2.04	.34	.34	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08

TABLE 12.3. (Concluded)

KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS.		500		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		25- UP		ZERO CROSS		TOTAL		ZERO CROSS		TOTAL	
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP
1 TO 4	13.10	3.74	1.70	.85	.00	.17	1.19	20.75	7.82	4.76	2.55	1.02	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
5 TO 9	9.52	3.23	2.38	.34	.51	.00	2.55	18.54	5.27	3.40	.51	1.02	.34	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	4.93	4.76	2.89	.85	.00	.34	.34	14.12	5.27	3.23	1.53	.68	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	27.55	11.73	6.97	2.04	.51	.51	4.08	53.40	18.37	11.39	4.59	2.72	.68	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS.		500		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		25- UP		ZERO CROSS		TOTAL		ZERO CROSS		TOTAL	
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP
1 TO 4	11.56	4.08	2.04	.51	.00	.17	2.55	20.92	9.49	5.27	4.70	.34	.51	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
5 TO 9	8.50	5.44	1.87	.34	.34	.34	2.38	19.22	6.80	2.21	2.04	.51	.51	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	4.68	5.27	3.40	.85	.34	.34	.17	14.46	4.25	2.55	1.87	.51	.51	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	24.15	14.80	7.31	1.70	.68	.85	5.10	54.59	20.75	10.03	5.61	1.36	.85	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
KSC PEAK WINDS		TAILWINDS VS CROSSWINDS		MONTH OF DEC.		NUMBER OBS.		500		RUNWAY 33		CROSSWIND LIMITS ***		PERCENTAGES		25- UP		25- UP		ZERO CROSS		TOTAL		ZERO CROSS		TOTAL	
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	25- UP	25- UP	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP	25- UP
1 TO 4	11.22	6.12	3.02	.51	.17	.34	3.23	22.62	8.33	3.91	2.21	.68	.34	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
5 TO 9	8.16	4.59	1.70	.51	.00	.17	2.55	17.69	5.27	3.23	2.38	.85	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10- UP	4.59	5.78	2.55	1.19	.17	.17	.00	14.46	4.08	3.74	1.70	.68	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	23.98	16.50	5.27	2.21	.34	.68	5.78	54.76	17.69	10.88	6.29	2.21	.34	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

TABLE 12.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END

		KSC PEAK WINDS		HEAD/TAIL WIND REVERSALS		MONTH OF DEC.	
		*** RUNWAY 15 ***		*** RUNWAY 33 ***			
MMS		GIVEN A		GIVEN A			
		HEAD WIND TAIL WIND		HEAD WIND TAIL WIND			
		PERCENTAGE		PERCENTAGE			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
TOTAL		HEAD-TAIL		HEAD-TAIL			
		TAIL-HEAD		TAIL-HEAD			
		TO TAIL		TO TAIL			
		TO HEAD		TO HEAD			
		PERCENTAGE		PERCENTAGE			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
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		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			
		REVERSALS		REVERSALS			

TABLE 12.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

RUNWAY COMPONENT CLASS (KNOTS)	NSC PEAK WINDS				HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF DEC.											
	*** RUNWAY 15 ***				*** RUNWAY 33 ***											
	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	HOURS 06-08 CPF
0-1	13.59	4.77	6.32	7.56	8.86	9.09	5.28	4.53	5.78	6.27	6.27	5.28	4.53	5.78	6.27	6.27
1-2	22.66	16.16	12.13	13.56	15.83	13.08	9.90	9.26	10.20	10.70	10.70	9.90	9.26	10.20	10.70	10.70
2-3	31.87	19.73	15.35	20.34	21.39	20.22	12.72	11.82	12.72	13.22	13.22	12.72	11.82	12.72	13.22	13.22
3-4	40.63	24.52	20.00	24.38	26.82	27.36	15.46	14.28	15.46	16.00	16.00	15.46	14.28	15.46	16.00	16.00
4-5	48.12	29.18	24.90	29.86	32.38	37.04	20.36	17.73	20.36	21.00	21.00	20.36	17.73	20.36	21.00	21.00
5-6	55.16	34.66	28.65	34.16	37.43	44.01	24.41	20.59	24.41	25.00	25.00	24.41	20.59	24.41	25.00	25.00
6-7	59.22	38.63	31.35	38.07	41.07	50.30	27.90	23.65	27.90	28.50	28.50	27.90	23.65	27.90	28.50	28.50
7-8	64.84	42.68	36.13	44.20	46.26	55.82	31.95	26.50	31.95	32.50	32.50	31.95	26.50	31.95	32.50	32.50
8-9	69.53	48.77	39.74	49.80	51.20	61.51	37.23	30.74	37.23	38.00	38.00	37.23	30.74	37.23	38.00	38.00
9-10	76.25	58.08	46.65	57.50	59.41	68.99	45.05	39.21	45.05	46.00	46.00	45.05	39.21	45.05	46.00	46.00
10-11	80.16	61.92	55.35	63.10	64.49	73.32	48.54	44.14	48.54	49.00	49.00	48.54	44.14	48.54	49.00	49.00
11-12	83.59	66.03	59.61	68.97	68.96	77.49	55.14	49.46	55.14	56.00	56.00	55.14	49.46	55.14	56.00	56.00
12-13	85.78	71.64	66.19	75.49	74.31	81.22	61.07	55.57	61.07	62.00	62.00	61.07	55.57	61.07	62.00	62.00
13-14	89.06	78.36	71.48	81.49	79.70	84.71	67.67	61.97	67.67	68.00	68.00	67.67	61.97	67.67	68.00	68.00
14-15	90.78	82.33	76.52	85.79	83.55	87.17	73.80	67.49	73.80	74.00	74.00	73.80	67.49	73.80	74.00	74.00
15-16	92.03	85.75	80.00	89.57	86.61	89.38	78.70	71.63	78.70	79.00	79.00	78.70	71.63	78.70	79.00	79.00
16-17	94.22	88.08	84.39	92.31	89.56	91.25	83.41	77.24	83.41	84.00	84.00	83.41	77.24	83.41	84.00	84.00
17-18	95.62	90.41	87.10	94.26	91.69	92.18	86.62	80.79	86.62	87.00	87.00	86.62	80.79	86.62	87.00	87.00
18-19	96.72	93.42	91.23	96.09	94.27	93.88	89.16	85.22	89.16	90.00	90.00	89.16	85.22	89.16	90.00	90.00
19-20	98.12	96.16	93.94	97.26	96.29	95.24	92.27	88.97	92.27	93.00	93.00	92.27	88.97	92.27	93.00	93.00
20-21	98.75	97.40	95.74	98.44	97.53	95.92	93.50	90.74	93.50	94.00	94.00	93.50	90.74	93.50	94.00	94.00
21-22	99.22	98.63	97.68	99.35	98.70	96.94	95.10	92.81	95.10	96.00	96.00	95.10	92.81	95.10	96.00	96.00
22-23	99.53	99.32	98.58	99.61	99.24	97.96	95.76	94.19	95.76	96.00	96.00	95.76	94.19	95.76	96.00	96.00
23-24	99.73	99.73	99.35	99.61	99.55	98.22	97.36	95.86	97.36	97.00	97.00	97.36	95.86	97.36	97.00	97.00
24-25	100.00	99.73	99.35	99.61	99.66	98.64	98.40	97.04	98.40	98.00	98.00	98.40	97.04	98.40	98.00	98.00
25-26	100.00	100.00	99.48	99.61	99.76	99.07	98.87	98.03	98.87	98.00	98.00	98.87	98.03	98.87	98.00	98.00
26-27	100.00	100.00	99.48	99.61	99.79	99.24	99.15	98.33	99.15	98.00	98.00	99.15	98.33	99.15	98.00	98.00
27-28	100.00	100.00	99.61	99.74	99.83	99.49	99.38	98.72	99.38	98.00	98.00	99.38	98.72	99.38	98.00	98.00
28-29	100.00	100.00	100.00	99.74	99.93	99.66	99.62	99.11	99.62	99.00	99.00	99.62	99.11	99.62	99.00	99.00
29-30	100.00	100.00	100.00	99.74	99.93	99.83	99.93	99.51	99.83	99.00	99.00	99.93	99.51	99.83	99.00	99.00
30-31	100.00	100.00	100.00	99.87	99.97	99.92	99.62	99.61	99.92	99.00	99.00	99.62	99.61	99.92	99.00	99.00
31-32	100.00	100.00	100.00	99.87	99.97	100.00	99.72	99.70	99.97	99.00	99.00	99.72	99.70	99.97	99.00	99.00
32-33	100.00	100.00	100.00	99.87	99.97	100.00	99.97	99.80	99.97	99.00	99.00	99.97	99.80	99.97	99.00	99.00
33-34	100.00	100.00	100.00	100.00	100.00	100.00	99.91	99.80	99.91	99.00	99.00	99.91	99.80	99.91	99.00	99.00
34-35	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.91	100.00	99.00	99.00	100.00	99.91	100.00	99.00	99.00
35-36	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.90	100.00	99.00	99.00	100.00	99.90	100.00	99.00	99.00
36-37	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.90	100.00	99.00	99.00	100.00	99.90	100.00	99.00	99.00
37-38	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
NDBS	640	730	775	767	2912	1177	1061	1015	1020	4273	4273	1061	1015	1020	4273	4273

TABLE 13.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND
PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF ANNUAL										NUMBER OBS. 6663									
HOUR 0										HOUR 1									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4										1 TO 4									
5 TO 9										5 TO 9									
10- UP										10- UP									
TOTAL										TOTAL									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4										1 TO 4									
5 TO 9										5 TO 9									
10- UP										10- UP									
TOTAL										TOTAL									
PERCENTAGES										PERCENTAGES									
1 TO 4	8.48	4.70	1.05	.81	.14	.11	1.61	17.29	14.14	6.80	1.95	1.05	.18	.03	2.42	26.56			
5 TO 9	4.05	2.85	1.59	.53	.21	.12	1.70	11.35	8.54	6.05	2.52	.72	.35	.06	3.42	21.66			
10- UP	2.72	3.36	1.41	.51	.17	.09	.12	8.37	4.68	3.84	1.73	.60	.15	.11	.21	11.32			
TOTAL	15.25	10.91	4.05	1.85	.51	.32	3.42	36.71	27.36	16.69	6.20	2.37	.68	.20	6.05	59.54			

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF ANNUAL										NUMBER OBS. 6663									
HOUR 1										HOUR 2									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4										1 TO 4									
5 TO 9										5 TO 9									
10- UP										10- UP									
TOTAL										TOTAL									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4										1 TO 4									
5 TO 9										5 TO 9									
10- UP										10- UP									
TOTAL										TOTAL									
PERCENTAGES										PERCENTAGES									
1 TO 4	8.36	5.54	1.40	.74	.21	.08	1.61	17.92	14.53	6.77	1.73	.98	.21	.00	2.72	26.92			
5 TO 9	4.20	3.12	1.23	.39	.29	.06	1.62	10.91	7.98	6.63	2.45	.75	.24	.06	3.18	21.30			
10- UP	3.08	3.48	1.35	.47	.17	.14	.17	8.84	3.81	3.14	1.79	.54	.27	.09	.33	9.97			
TOTAL	15.64	12.14	3.98	1.59	.66	.27	3.39	37.67	26.32	16.54	5.96	2.27	.72	.15	6.23	58.19			

KSC PEAK WINDS										TAILWINDS VS CROSSWINDS									
MONTH OF ANNUAL										NUMBER OBS. 6664									
HOUR 2										HOUR 3									
TAILWIND LIMITS ***										TAILWIND LIMITS ***									
1 TO 4										1 TO 4									
5 TO 9										5 TO 9									
10- UP										10- UP									
TOTAL										TOTAL									
RUNWAY 15										RUNWAY 33									
*** CROSSWIND LIMITS ***										*** CROSSWIND LIMITS ***									
1 TO 4										1 TO 4									
5 TO 9										5 TO 9									
10- UP										10- UP									
TOTAL										TOTAL									
PERCENTAGES										PERCENTAGES									
1 TO 4	9.50	5.70	1.31	.87	.11	.11	1.95	19.54	15.08	7.07	1.70	.87	.17	.03	2.48	28.18			
5 TO 9	4.74	3.08	1.29	.50	.12	.05	1.79	11.55	7.07	5.93	2.40	.62	.20	.06	2.61	18.88			
10- UP	3.24	3.51	1.28	.39	.15	.09	.09	8.75	3.15	3.11	1.53	.66	.18	.08	.27	8.97			
TOTAL	17.48	12.29	3.87	1.76	.38	.24	3.83	39.84	26.10	16.10	5.63	2.15	.54	.17	5.36	56.03			

TABLE 13.3. (Continued)

TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF ANNUAL			NUMBER OBS. 6664			RUNWAY 33			ZERO CROSS		
HOUR	3		TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	PERCENTAGES	25- UP		TOTAL	1 TO 4	5 TO 9
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1 TO 4	10.44	5.48	1.35	.83	.15	.09	1.89	20.23	16.87	6.71	1.68	.77	.11	.08
5 TO 9	5.79	3.03	1.04	.29	.17	.06	1.82	12.18	5.99	5.78	2.01	.65	.17	.05
10- UP	3.53	3.57	1.68	.47	.21	.05	.14	9.63	2.76	2.45	1.56	.59	.12	.05
TOTAL	19.76	12.08	4.07	1.58	.53	.20	3.84	42.05	25.62	14.93	5.25	2.00	.39	.17
TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF ANNUAL			NUMBER OBS. 6664			RUNWAY 33			ZERO CROSS		
HOUR	4		TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	PERCENTAGES	25- UP		TOTAL	1 TO 4	5 TO 9
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1 TO 4	11.45	5.19	1.31	.57	.12	.11	2.28	20.83	16.97	7.17	1.79	.95	.18	.03
5 TO 9	6.42	2.75	1.10	.41	.12	.08	2.71	12.88	5.33	5.03	1.88	.59	.21	.03
10- UP	3.41	3.80	1.50	.46	.21	.05	.09	9.53	2.42	2.37	1.50	.50	.14	.05
TOTAL	21.08	11.73	3.90	1.46	.45	.23	4.38	43.23	24.71	14.57	5.16	2.03	.53	.11
TAILWINDS VS CROSSWINDS														
MSC PEAK WINDS			MONTH OF ANNUAL			NUMBER OBS. 6664			RUNWAY 33			ZERO CROSS		
HOUR	5		TOTAL	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	PERCENTAGES	25- UP		TOTAL	1 TO 4	5 TO 9
TAILWIND LIMITS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	PERCENTAGES	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25- UP	TOTAL
1 TO 4	12.74	4.95	1.38	.80	.18	.14	2.24	22.42	17.17	6.65	1.52	.86	.14	.09
5 TO 9	6.67	2.96	1.10	.24	.14	.08	1.95	13.33	5.08	4.37	1.79	.63	.14	.02
10- UP	3.62	3.48	1.38	.48	.18	.03	.20	9.86	2.45	2.39	1.25	.57	.12	.03
TOTAL	23.23	11.88	3.86	1.52	.50	.24	4.38	45.60	24.65	13.40	4.55	2.06	.39	.14

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TABLE 13.5. (Continued)

KSC PEAK WINDS				TAILWINDS VS CROSSWINDS				MONTH OF ANNUAL			
HOUR 9				NUMBER OBS. 6663							
RUNWAY 15				RUNWAY 33							
*** CROSSWIND LIMITS ***				*** CROSSWIND LIMITS ***							
1 TO 5 TO 9 10TOL14 15TOL19 20TOL24				1 TO 5 TO 9 10TOL14 15TOL19 20TOL24				25- UP			
PERCENTAGES				PERCENTAGES							
TAILWIND LIMITS				TOTAL				ZERO CROSS			
1 TO 4	5 TO 9	10TOL14	15TOL19	1 TO 4	5 TO 9	10TOL14	15TOL19	20TOL24	25- UP	ZERO CROSS	TOTAL
2.93	5.30	3.05	1.26	13.37	2.27	7.14	4.38	.36	.14	.09	16.21
1 TO 4	5 TO 9	10TOL14	15TOL19	18.60	3.77	6.69	4.19	.33	.12	1.55	17.77
5.13	4.53	1.88	.69	18.57	6.17	6.14	3.20	.35	.12	.36	17.38
7.26	7.61	2.21	.86	46.54	12.20	19.98	11.77	4.01	.38	2.00	51.36
10- UP	15.52	17.44	7.13								

TAILWIND LIMITS		*** CROSSWIND LIMITS ***										KSC PEAK WINDS		MONTH OF ANNUAL		TAILWINDS VS CROSSWINDS										TOTAL						
		RUNWAY 15					RUNWAY 33									NUMBER OBS. 6665																
		PERCENTAGES					PERCENTAGES									25- UP										ZERO CROSS						
		1	10	4	5	TO 9	10	1014	15	TO 19	20	TO 24	25-	UP	ZERO	CROSS																
1	TO 4	1.28	4.85	3.23	1.59								.11		.09		11.51	*	.95	5.27	4.83	2.39	.32	.11		.05		13.89				
5	TO 9	5.78	5.33	1.98	.62		.27						.12		1.02		13.11	*	2.85	6.48	5.01	1.40	.35	.15		1.55		17.73				
10-	UP	6.39	7.77	2.81	.86		.30						.16		.24		20.50	*	8.51	6.77	3.57	1.20	.45	.20		.33		21.02				
TOTAL		13.44	17.94	6.01	3.06								.34		1.35		45.12	*	12.30	18.47	13.41	4.98	1.11	.45		1.92		52.65				

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TABLE 13.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL
PERCENTAGE FREQUENCIES BY RUNWAY END

MRS	KSC PEAK WINDS		HEAD/TAI WIND REVERSALS		MONTH OF		ANNUAL		KSC PEAK WINDS		HEAD/TAI WIND REVERSALS		MONTH OF		ANNUAL		KSC PEAK WINDS		HEAD/TAI WIND REVERSALS		MONTH OF		ANNUAL		KSC PEAK WINDS		HEAD/TAI WIND REVERSALS		MONTH OF		ANNUAL	
	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	PERCENTAGE REVERSALS	
00-02	9.21	5.49	3.72	8.86	9.76	9.55	3.72	5.82	8.84	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	
03-05	9.68	5.90	3.97	10.47	9.11	10.35	4.11	6.23	8.47	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	
06-08	10.90	5.24	5.67	10.00	11.80	11.26	6.38	4.88	12.28	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	
09-11	11.17	4.88	6.29	8.89	13.94	11.14	6.28	4.87	13.29	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	9.22	
12-14	11.05	5.23	5.82	8.98	13.03	11.07	5.86	5.21	13.41	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	
15-17	9.93	4.67	5.26	7.43	13.03	9.94	5.16	4.76	12.21	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	8.28	
18-20	8.66	3.96	4.90	6.35	13.04	8.92	4.82	4.10	11.98	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	6.86	
21-23	9.57	4.91	4.66	7.66	12.98	9.87	4.72	5.15	11.99	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	
00-23	10.07	5.03	5.04	8.58	12.19	10.26	5.13	5.13	11.55	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23	

13.4A

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TABLE 13.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

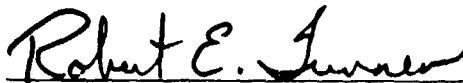
RUNWAY CLASS (KNOTS)	HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF ANNUAL											
	MAY				JUN				JUL			
	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF
U-1	14.40	8.31	5.74	6.40	8.54	8.47	7.21	8.21	8.21	8.47	7.21	8.21
1-2	23.70	15.06	13.30	12.97	16.05	15.33	15.44	16.17	16.17	15.33	15.44	16.17
2-3	33.71	19.46	16.39	16.78	21.25	19.92	18.93	20.06	20.06	19.92	18.93	20.06
3-4	42.36	24.85	20.94	22.14	27.17	24.97	23.49	25.58	25.58	24.97	23.49	25.58
4-5	52.47	29.98	25.54	26.82	33.19	29.69	27.42	30.55	30.55	29.69	27.42	30.55
5-6	60.05	36.79	31.58	33.52	39.95	35.38	32.73	36.74	36.74	35.38	32.73	36.74
6-7	66.11	41.77	36.20	38.73	45.14	40.12	36.24	41.14	41.14	40.12	36.24	41.14
7-8	71.34	46.04	40.06	43.72	49.92	44.99	39.66	45.35	45.35	44.99	39.66	45.35
8-9	76.23	52.70	45.65	49.82	55.60	50.12	44.47	50.25	50.25	50.12	44.47	50.25
9-10	82.49	61.99	53.97	58.27	63.66	57.41	51.19	58.74	58.74	57.41	51.19	58.74
10-11	85.58	67.13	59.16	63.14	68.27	61.43	55.04	60.55	60.55	61.43	55.04	60.55
11-12	88.31	72.74	65.18	67.99	73.12	66.43	59.54	64.71	64.71	66.43	59.54	64.71
12-13	90.62	77.65	71.22	72.92	77.73	70.93	64.08	69.25	69.25	70.93	64.08	69.25
13-14	92.98	82.56	77.19	77.91	82.34	75.53	69.23	73.38	73.38	75.53	69.23	73.38
14-15	94.50	86.21	81.26	81.84	85.68	79.14	73.36	76.54	76.54	79.14	73.36	76.54
15-16	95.37	89.28	85.04	85.15	88.49	81.85	76.60	82.74	82.74	81.85	76.60	82.74
16-17	96.71	91.86	88.58	88.11	91.15	85.20	80.40	85.68	85.68	85.20	80.40	85.68
17-18	97.38	93.58	90.82	90.78	93.00	87.46	83.29	88.81	88.81	87.46	83.29	88.81
18-19	97.94	95.19	92.98	92.98	94.67	90.13	86.63	90.26	90.26	90.13	86.63	90.26
19-20	98.54	97.16	95.30	95.21	96.48	92.76	90.09	92.79	92.79	92.76	90.09	92.79
20-21	98.61	97.84	96.33	96.22	97.24	93.95	91.76	94.48	94.48	93.95	91.76	94.48
21-22	99.15	98.59	97.40	97.32	98.07	95.84	93.78	96.62	96.62	95.84	93.78	96.62
22-23	99.35	98.96	97.97	98.03	98.54	96.80	95.10	98.51	98.51	96.80	95.10	98.51
23-24	99.50	99.43	98.71	98.78	99.09	97.78	96.35	99.72	99.72	97.78	96.35	99.72
24-25	99.61	99.62	99.00	99.09	99.31	98.40	97.30	99.81	99.81	98.40	97.30	99.81
25-26	99.71	99.70	99.36	99.35	99.52	98.47	98.10	99.84	99.84	98.47	98.10	99.84
26-27	99.82	99.84	99.56	99.55	99.67	99.63	98.50	99.86	99.86	99.63	98.50	99.86
27-28	99.88	99.88	99.72	99.71	99.78	99.76	98.96	99.82	99.82	99.76	98.96	99.82
28-29	99.92	99.85	99.44	99.79	99.85	99.83	99.36	99.84	99.84	99.83	99.36	99.84
29-30	99.93	99.88	99.88	99.86	99.89	99.79	99.61	99.87	99.87	99.79	99.61	99.87
30-31	99.93	99.90	99.91	99.91	99.91	99.83	99.70	99.85	99.85	99.83	99.70	99.85
31-32	99.95	99.95	99.93	99.92	99.94	99.96	99.81	99.88	99.88	99.96	99.81	99.88
32-33	99.95	99.97	99.97	99.93	99.96	99.97	99.81	99.87	99.87	99.97	99.81	99.87
33-34	99.95	99.99	99.97	99.94	99.96	99.94	99.85	99.92	99.92	99.94	99.85	99.92
34-35	99.96	100.00	99.97	99.96	99.97	99.94	99.85	99.93	99.93	99.94	99.85	99.93
35-36	99.96	99.96	99.97	99.97	99.98	99.97	99.92	99.95	99.95	99.97	99.92	99.95
36-37	99.97	99.97	99.98	99.97	99.98	99.98	99.95	99.96	99.96	99.98	99.95	99.96
37-38	99.97	99.97	99.98	99.97	99.98	99.98	99.97	99.98	99.98	99.98	99.97	99.98
38-39	99.98	99.98	99.98	99.97	99.98	99.99	99.99	99.99	99.99	99.99	99.99	99.99
39-40	99.98	99.98	99.99	99.97	99.98	100.00	100.00	99.99	99.99	100.00	99.99	99.99
40-41	99.99	99.99	99.99	99.97	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.99
41-42	99.99	99.99	99.99	99.97	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.99
42-43	99.99	99.99	99.99	99.98	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.99

APPROVAL

GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1979 REVISION)

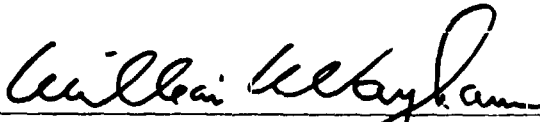
By D. L. Johnson and S. C. Brown

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ROBERT E. TURNER

Chief, Environmental Applications Branch



WILLIAM W. VAUGHAN

Chief, Atmospheric Sciences Division



CHARLES A. LUNDQUIST

Director, Space Sciences Laboratory